Agilent 1200 Series High Performance Autosamplers & Micro Well Plate Autosampler

Service Manual

Notices

© Agilent Technologies, Inc. 2006, 2008

No part of this manual may be reproduced in any form or by any means (including electronic storage and retrieval or translation into a foreign language) without prior agreement and written consent from Agilent Technologies, Inc. as governed by United States and international copyright laws.

Manual Part Number

G1367-90110

Edition

05/08

Printed in Germany

Agilent Technologies
Hewlett-Packard-Strasse 8
76337 Waldbronn

Research Use Only

Not for use in Diagnostic Procedures.

Warranty

The material contained in this document is provided "as is," and is subject to being changed, without notice, in future editions. Further, to the maximum extent permitted by applicable law, Agilent disclaims all warranties, either express or implied, with regard to this manual and any information contained herein, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Agilent shall not be liable for errors or for incidental or consequential damages in connection with the furnishing, use, or performance of this document or of any information contained herein. Should Agilent and the user have a separate written agreement with warranty terms covering the material in this document that conflict with these terms, the warranty terms in the separate agreement shall control.

Technology Licenses

The hardware and/or software described in this document are furnished under a license and may be used or copied only in accordance with the terms of such license.

Restricted Rights Legend

If software is for use in the performance of a U.S. Government prime contract or subcontract, Software is delivered and licensed as "Commercial computer software" as defined in DFAR 252.227-7014 (June 1995), or as a "commercial item" as defined in FAR 2.101(a) or as "Restricted computer software" as defined in FAR 52.227-19 (June 1987) or any equivalent agency regulation or contract clause. Use, duplication or disclosure of Software is subject to Agilent Technologies' standard commercial license terms, and non-DOD Departments and Agencies of the U.S. Government will receive no greater than Restricted Rights as defined in FAR 52.227-19(c)(1-2) (June 1987). U.S. Government users will receive no greater than Limited Rights as defined in FAR 52.227-14 (June 1987) or DFAR 252.227-7015 (b)(2) (November 1995), as applicable in any technical data.

Safety Notices

CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

Contents

1 Introduction 7

Introduction to the 1200 Series Samplers 8
Sampling Sequence 11
Sampling Unit 15
Needle/Sample Transport Assembly 18
Advanced Operating Modes 20
Early Maintenance Feedback (EMF) 22
Electrical Connections 23

2 Site Requirements and Specifications 25

Site Requirements 26
Physical Specifications 29
Performance Specifications 30

3 Installing the Autosampler 33

Unpacking the Sampler 34
Optimizing the Stack Configuration 37
Installing the Autosampler, , , , 42
Installing a Thermostatted Autosampler, , , 45
Flow Connections to the Sampler, 49
Installing the Sample Tray 51
Transporting the Sampler, 53

4 Configuring the Autosampler 55

Autosampler Control and Electronics 56
Position and Movement Sensors, 57
Microtiter Plate Board (MTP), 58
Firmware Description, 63
Optional Interface Boards, , 66
Agilent 1100/1200 Series Interfaces, 71
Setting the 8-bit Configuration Switch, , , 77
The Main Power Supply Assembly 82

5 Using the Autosampler 83

Sample Trays, 84
List of Recommended Plates and Closing Mat, 85
List of Recommended Vials and Caps 87
Configure Well Plate Types 89
Turn ON and Initialization Steps 92

6 Optimizing Performance 93

Optimizing Performance 94
Optimization for Lowest Carry-Over 95
Fast Injection Cycle and Low Delay Volume 102
Precise Injection Volume, 104
Choice of Rotor Seal 106
Choice of Seat Capillary 107

7 Troubleshooting and Diagnostics 109

Agilent Lab Monitor & Diagnostic Software 110
Overview of the Sampler's Indicators and Test Functions 111
Status Indicators 113
Error Messages 115
Maintenance Functions 143
High Performance Autosampler Step Commands , 145
Troubleshooting the G1367B/D and G1377A Autosampler 148
Errors Which May Occur During the Turn ON and Initialization Process 149
Instrument Logbook Errors and Step by Step Repair Process 156
Needle Centering Over the Vial or the Well 166

8 Maintenance 167

Introduction to Maintenance and Repair 168
Overview of Main Repair Procedures 171
Maintenance Functions 172
Early Maintenance Feedback (EMF) 173
Maintenance Procedures, 175

9 Repairs 197

Exchanging Internal Parts, 199

Warnings and Cautions 200
Assembling the Main Cover , 202
Light Protection Kit Installation 203
Top Cover and Foam, 204
Illumination Assembly 206
Transport Assembly, 208
Sampling Unit, 211
Analytical Head 214
Peristaltic Pump Motor 216
Injection-Valve Assembly , 219
Metering-Drive Motor and Belt , 222
Needle-lock Motor and Belt , 225
Main Fan, 227
Exhaust Fan, 229
MTP Main Board, , 232
Introduction, , , 235
SUD Board, 240
SLS Board, 243
Power Supply, 246
Leak Sensor , 249

10 Parts and Materials for Maintenance 253

Sampler Main Assemblies 254
Vial Trays, 257
High Performance Autosampler and SL+ Version Accessory Kit G1367-68705, , 259
Micro Well Plate Autosampler Accessory Kit G1377-68705, , 260
Multi-Draw Kit G1313-68711 (Only For G1367B), , , , 261
G1373A Injector Purge Kit Parts, 262
Thermostat for ALS/FC/Spotter 264

11 Parts for Repair 265

Sampling Unit Assembly, 266
Analytical-Head Assembly, 269
Injection-Valve Assembly, , 272
Sheet Metal Kit, 274
Cover Parts, , 275

Foam Parts, 276
Power and Status Light Pipes, 278
Leak System Parts, 279

12 Cable Identification 281

Cable Overview 282
Analog Cables, 284
Remote Cables, 287
BCD Cables, 294
Auxiliary Cable, 296
CAN Cable, 297
External Contact Cable, 298
RS-232 Cable Kit, 299
LAN Cables, 300

13 Appendix 301

General Safety Information 302
Lithium Batteries Information, , , 305
The Waste Electrical and Electronic Equipment Directive 306
Radio Interference 307
Sound Emission 308
Solvent Information 309
Agilent Technologies on the Internet 311

1 Introduction

Introduction to the 1200 Series Samplers 8
Sampling Sequence 11
Injection Sequence 12
Sampling Unit 15
Analytical Head 16
Injection-Valve 16
Needle Flush Station 17
Needle Lock 17
Needle/Sample Transport Assembly 18
Advanced Operating Modes 20
Early Maintenance Feedback (EMF) 22
Electrical Connections 23

Introduction to the 1200 Series Samplers

Three models of Agilent 1200 Series samplers are available that handle vials well plates, and Eppendorf tubes:

- G1367B Agilent 1200 Series high performance autosampler
- G1367D Agilent 1200 Series high performance autosampler SL
- G1377A Agilent 1200 Series micro well plate autosampler

The G1367B Agilent 1200 Series high performance autosampler adds maximum flexibility and fast injection cycles, whenever high sample throughput and speed of analysis are required.

Features: Increased sample injection speed for high sample throughput, overlapped injections for increased productivity, minimal delay volumes for rapid gradients and fast equilibration when bypassing the autosampler after sample injection, flexible and convenient sample handling with different types of sample containers. Using 384-well plates allows to process up to 768 samples unattended.

The G1367D Agilent 1200 Series High Performance Autosampler SL+ is specifically designed for the Agilent 1200 Series Rapid Resolution LC system for increased analysis speed with uncompromised sensitivity, resolution, precision and lowest carry over.

Features: Increased pressure range (up to 600 bar) enabling the use of today's column technology (sub-two-micron columns) with the Agilent 1200 Rapid Resolution LC System. Increased robustness by optimized new parts, high speed with lowest carry-over by flow through design, increased sample injection speed for high sample throughput, increased productivity by using overlapped injection mode and flexible and convenient sample handling with different types of sample containers, such as vials and well plates. Using 384-well plates allows you to process up to 768 samples unattended.

The G1377A Agilent 1200 Series Micro Well Plate Autosampler is designed to perform capillary LC with injection of sample volumes ranging from nL to µL.

Features: A micro Rheodyne® valve and the optimized design of the needle seat, loop and seat capillaries minimize dispersion. A high-resolution metering device offers resolution ten times better than a standard autosampler, bypass operation facilitates low delay volume, increased sample injection speed for high sample throughput, flexible and convenient sample handling with different types of sample containers. Using 384-well plates allows to process up to 768 samples unattended.

Technical Principle: The well plate sampler transport mechanism uses an X-Z-theta robot to optimize the positioning of the sampling arm on the well plate. Once the sampling arm is positioned over the programmed sample position, the programmed sample volume is drawn by the metering device into the sampling needle. The sampling arm then moves to the injection position where the sample is flushed onto the column.

The autosamplers employ a vial/plate pusher mechanism to hold down the vial or the plate while the needle is drawn back from the sample vessel (a must in the case a septum is used). This vial/plate pusher employs a sensor to detect the presence of a plate and to ensure accurate movement regardless of plate used. All axes of the transport mechanism (x-,z-,theta-robot) are driven by stepper-motors. Optical encoders ensure the correct operation of the movement.

The standard metering device (for the G1367B) provides injection volumes from 0.1–100 µl. A multi-draw kit extends the range up to 1500 µl. A 0.1-40µl injection volume metering device is installed in the G1367D, with the option to install an extended volume metering device and loop capillary with up to 100µl injection volume. The micro metering device (for the G1377A) provides injection volumes from 0.01 - 8 µl with the standard loop capillary installed and from 0.01 - 40 µl with the extended loop capillary. The entire flowpath including the metering device is always flushed by the mobile phase after injection for minimum internal carry-over.

An additional needle flush station with a peristaltic pump is installed to wash the outside of the needle. This reduces the already low carry-over for very sensitive analysis. The bottle containing the mobile phase for the wash procedure will be located in the solvent bottle cabinet. Produced waste during this operation is channeled safely away through a waste drain.

The six-port (only 5 ports are used) injection valve unit is driven by a high-speed hybrid stepper motor. During the sampling sequence, the valve unit bypasses the autosampler, and connects flow from the pump to the column directly. During injection and analysis, the valve unit directs the flow through the autosampler which ensures that all of the sample is injected onto the column, and that the metering unit and needle are always free from sample residue before the next sampling sequence begins. All the injection valves have different stator heads and different rotor seals. The volume of each valve is different.

Control of the vial/plate temperature in the thermostatted autosampler is achieved using an additional Agilent 1200 Series module; the Agilent 1200 Series thermostat for ALS/FC/Spotter.

The thermostat contains Peltier-controlled heat-exchangers. A fan draws air from the area above the sample vial tray of the autosampler. It is then blown through the fins of the cooling/heating module. There it is cooled or heated according the temperature setting. The thermostatted air enters the autosampler through a recess underneath the special designed sample tray. The air is then distributed evenly through the sample tray ensuring effective temperature control, regardless of how many vials are in the tray. In cooling mode condensation is generated on the cooled side of the Peltier elements. This condensed water is safely guided into a waste bottle for condensed water.

Sampling Sequence

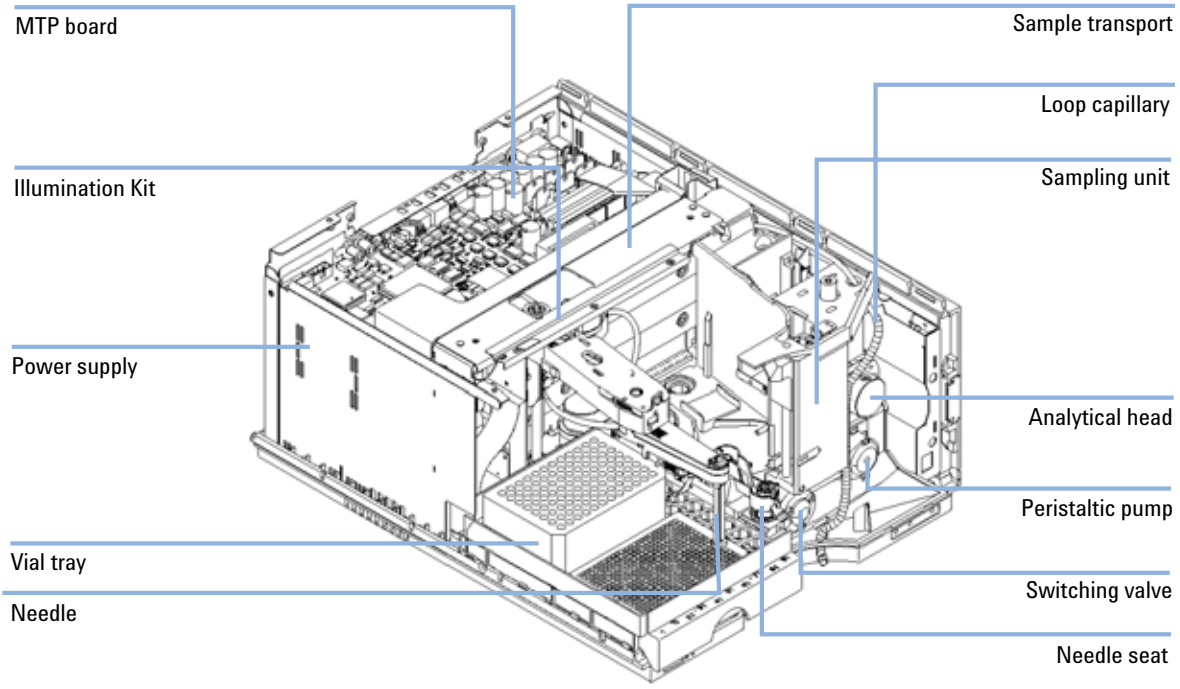


Figure 1 Overview of the autosampler

The movements of the autosampler components during the sampling sequence are monitored continuously by the autosampler processor. The processor defines specific time windows and mechanical ranges for each movement. If a specific step of the sampling sequence is not completed successfully, an error message is generated. Solvent is bypassed from the autosampler by the injection valve during the sampling sequence. The needle moves to the desired sample vial position and is lowered into the sample liquid in the vial to allow the metering device to draw up the desired volume by moving its plunger back

a certain distance. The needle is then raised again and moved onto the seat to close the sample loop. Sample is applied to the column when the injection valve returns to the mainpass position at the end of the sampling sequence.

The standard sampling sequence occurs in the following order:

1 The injection valve switches to the bypass position.
2 The plunger of the metering device moves to the initialization position.
3 The needle lock moves up.
4 The needle moves to the desired sample vial position.
5 The needle lowers into the vial.
6 The metering device draws the preset sample volume.
7 The needle lifts out of the vial.
8 The needle is then moved onto the seat to close the sample loop.
9 The needle lock moves down.
10 The injection cycle is completed when the injection valve switches to the mainpass position.

If needle wash is required it will be done between step 7 and 8.

Injection Sequence

Before the start of the injection sequence, and during an analysis, the injection valve is in the mainpass position (Figure 2 on page 13). In this position, the mobile phase flows through the autosampler metering device, sample loop, and needle, ensuring all parts in contact with sample are flushed during the run, thus minimizing carry-over

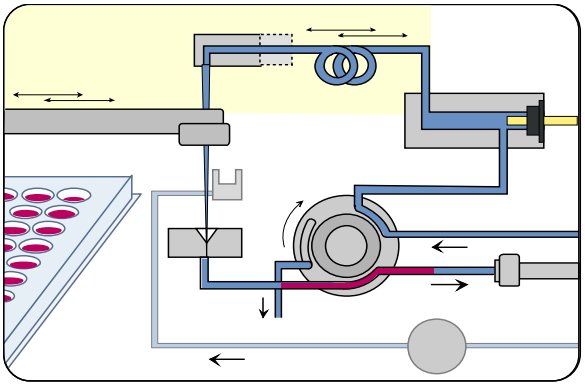


Figure 2 Mainpass Position

When the sample sequence begins, the valve unit switches to the bypass position (Figure 3 on page 13). Solvent from the pump enters the valve unit at port 1, and flows directly to the column through port 6.

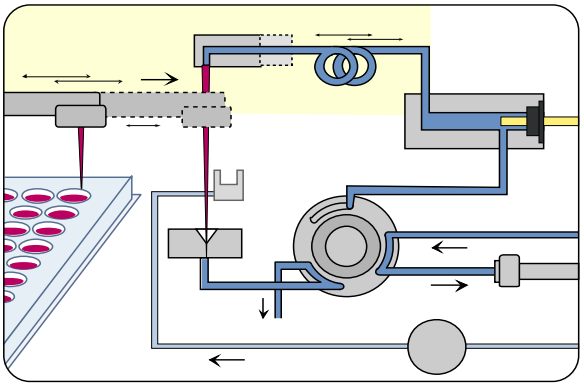


Figure 3 Bypass Position

The standard injection starts with „draw sample from vial”. In order to do this the needle moves to the desired sample vial position and is lowered into the sample liquid in the vial to allow the metering device to draw up the desired volume by moving its plunger back a certain distance. The needle is then raised again and moved onto the seat to close the sample loop. In case of an injector program several steps are interspersed at this point.

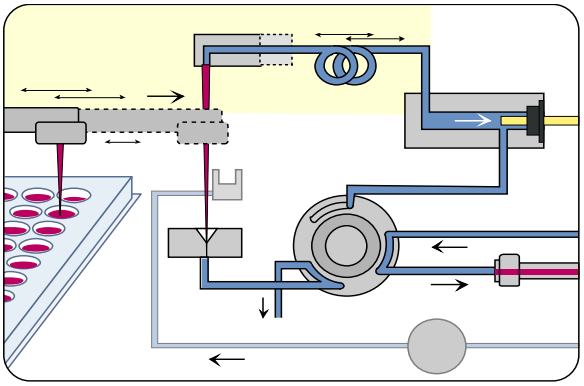


Figure 4 Drawing the Sample

Flush the Needle

Before injection and to reduce the carry-over for very sensitive analysis, the outside of the needle can be washed in a flush port located behind the injector port on the sampling unit. As soon the needle is on the flush port a peristaltic pump delivers some solvent during a defined time to clean the outside of the needle. At the end of this process the needle returns to the injection port.

Inject-and-Run

The final step is the inject-and-run step. The six-port valve is switched to the main-pass position, and directs the flow back through the sample loop, which now contains a certain amount of sample. The solvent flow transports the sample onto the column, and separation begins. This is the beginning of a „run” within an analysis. In this stage, all major performance-influencing hardware is flushed internally by the solvent flow. For standard applications no additional flushing procedure is required.

Sampling Unit

The sampling unit consists of subsystems as well. The main carrier part is a die casting part which carries the following functional elements.

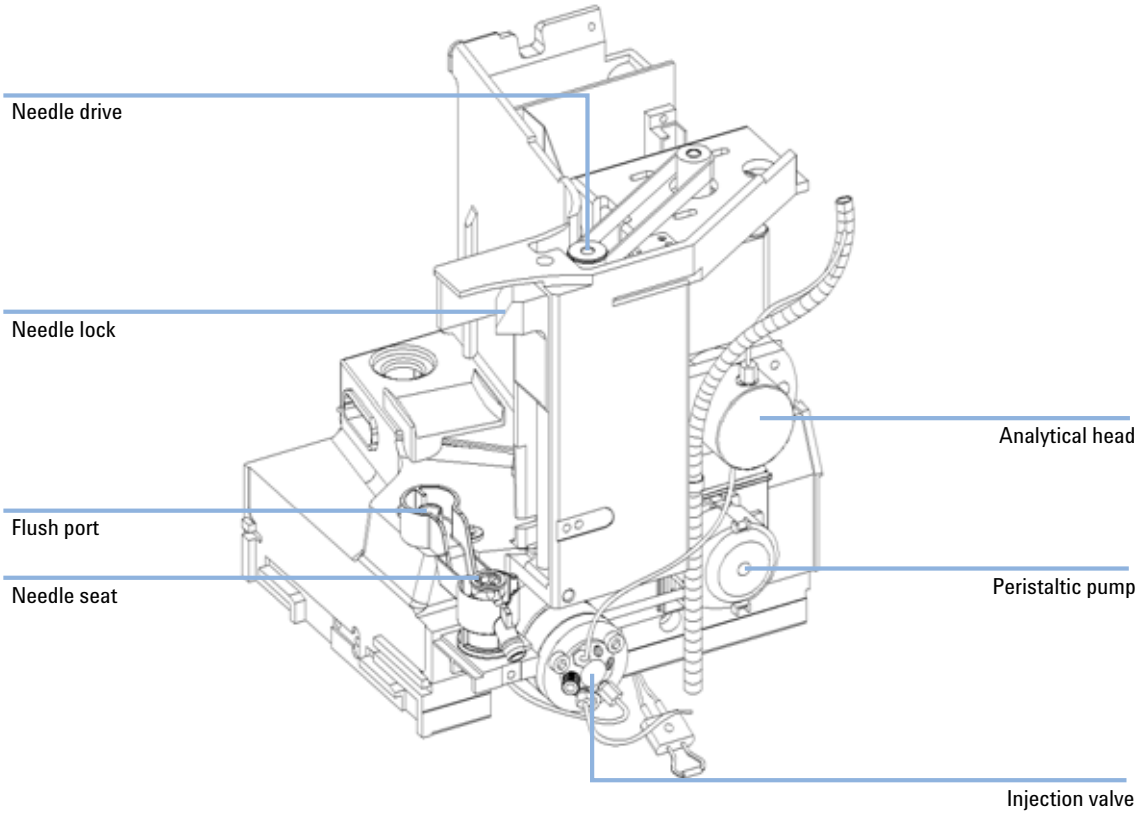


Figure 5 Sampling unit

Analytical Head

The analytical head is driven by the stepper motor connected to the drive shaft by a toothed belt. The drive nut on the spindle converts the circular movement of the spindle to linear motion. The drive nut pushes the sapphire plunger against the tension of the spring into the analytical head. The base of the plunger sits on the large bearing of the drive nut, which ensures the plunger is always centered. A ceramic ring guides the movement of the plunger in the analytical head. The home position of the plunger is sensed by an infra-red sensor on the sampling unit flex board, while the sample volume is determined by counting the number of steps from the home position (7 nl/motor step). The backward movement of the plunger (driven by the spring) draws sample from the vial.

To reduce potential user mistakes different versions of analytical heads are recognized by RF-tags sitting on the exchangeable assembly.

Table 1 Analytical head Technical Data

	Standard 100 µl (G1367-60003)	High Pressure 40µl (G1377-60023)	Micro 40 µl (G1377-60013)
Number of steps	15000	15000	60000
Volume resolution	14 nl/motor step	5.6 nl/motor step	1.4 nl/motor step
Maximum stroke	100 µl	40 µl	40 µl
Pressure limit	400 bars	600 bars	400 bars
Plunger material	Sapphire	Sapphire	Sapphire

Injection-Valve

A high pressure 6-port/2-position-valve to direct streams of mobile phase and sample to different directions (e.g. via loop to column or directly to column).

The two-position 6-port injection valve is driven by a stepper motor. Only five of the six ports are used (port 3 is not used). A lever/slider mechanism transfers the movement of the stepper motor to the injection valve. Two microswitches monitor switching of the valve (bypass and mainpass end positions). The injection valve has a ceramic stator, Vespel rotor seal (Tefzel

seal available), and stainless-steel head. Three screws hold the head and internal components in place. No valve adjustments are required after replacing internal components.

Table 2 Injection-Valve Technical Data

	Standard (0101-0921)	Micro (0101-1050)	High pressure (0101-1422)
Motor type	4 V, 1.2 A stepper motor	4 V, 1.2 A stepper motor	4 V, 1.2 A stepper motor
Seal material	Vespel™ or Tefzel™	Vespel™	PEEK
Stator material	Ceramic/PEEK	Head coated SST	Ultralife
Number of ports	6	6	6
Switching time	< 150 ms	< 150 ms	< 150 ms

Needle Flush Station

A needle flush station to wash the outer surface of the injection needle and a peristaltic pump to deliver fresh solvent to the wash station. (The reservoir for the solvent is located in the solvent cabinet, the waste is channeled by a separate flex tube to a waste bottle.

Needle Lock

A needle lock is used to support the needle carrier in its function making a firm seal of the needle in its seat.

The needle lock arm is driven by a stepper motor connected to the spindle assembly by a toothed belt.

Needle / Sample Transport Assembly

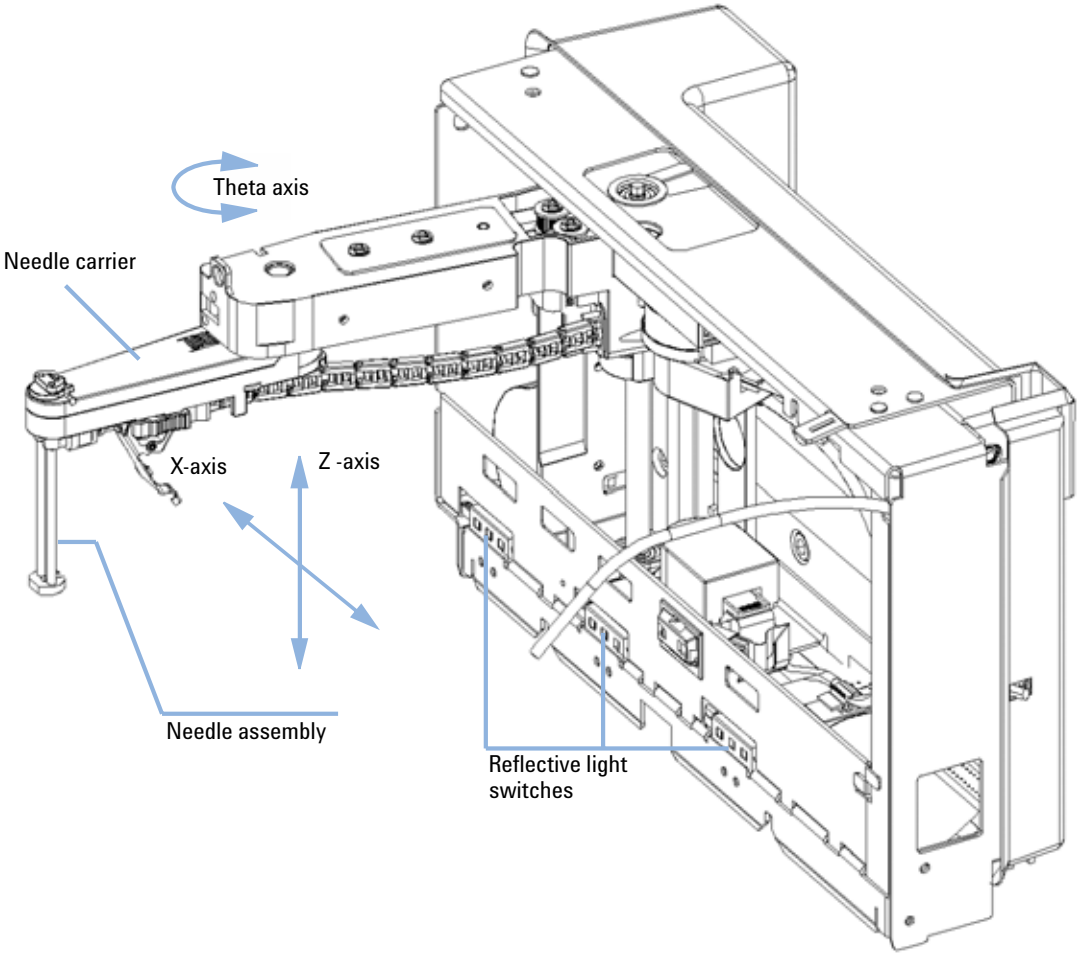


Figure 6 Needle / Sample Transport Assembly

The needle/sample transport is a multifunctional module capable of moving the needle into various positions (such as different wells in two different plates, different vials, needle wash position and the needle-seat position). The active movable axes are the X-axis, the Z-axis and the theta-axis, the

vial-/plate pusher is an additional passive axis. All axes are stepper motor driven and encoder controlled in order to have tight feedback for the axes position. The theta and Z axes have spring loaded belt-tensioner.

Reflective light switches detect the presence and type of different trays. The X-slide carries the antenna and electronics of a RF-sensor. This device has multiple functions:

- It allows to read and write information from a tag, located in the new tray.
- It allows to increase the number of different trays.
- It allows to read the revision and other data tags of the needle/sample transport assembly and sampling unit.

Complex flex boards make the electrical connection to the various motors, sensors and the MTP-board. The needle carrier has an integrated plate/vial pusher with an additional linear encoder to sense vials and the presence of plates.

The needle and the loop capillary are user-exchangeable.

The back of the needle/sample transport assembly has a cover to protect the electronics from potential solvent vapor.

Advanced Operating Modes

Multi-Draw Mode (Optional)

The multi-draw mode provides injection volumes up to 1500 µl. In this case a capillary which holds the additional volume is assembled between seat and valve. Then the aspirated sample is pushed into the enlarged seat capillary before repetitive aspiration starts. After the last aspiration took place the injection valve switches and the mobile phase transports sample towards column.

Injector Program

A sequence of all available single sampling steps can be tailored to customer needs for special applications. Injector program capability is offered with the standard instrument

Active Needle Wash

The active needle wash mode allows also the flushing of the outer surface of the needle. This results in an additional decrease of sample carry-over. Duration of the procedure is setable.

Overlap Injection Cycle

Overlapped injection is the mode where the autosampler runs the injector program for the next analysis during the current analysis (without injecting).

After the sample has reached the column the valve is switched back to bypass and the next injection cycle starts but waits with switching to main-pass until the actual run is finished. This mode allows it to increase the sample throughput.

Low Delay Volume Mode

This mode is especially interesting for gradient elution with small bore or capillary columns. The injection valve is switched back to bypass after the sample is eluted beyond the injection valve port # 6. This decreases the delay volume, because the gradient needs not to pass the metering device and the loop capillary.

Early Maintenance Feedback (EMF)

The early maintenance feedback (EMF) feature monitors the usage of specific components in the instrument, and provides feedback when the user-settable limits have been exceeded. The visual feedback in the user interface provides an indication that maintenance procedures should be scheduled.

For details on EMF counters and how to use them, see LMD (Lab Monitor and Diagnostic software) documentation.

Electrical Connections

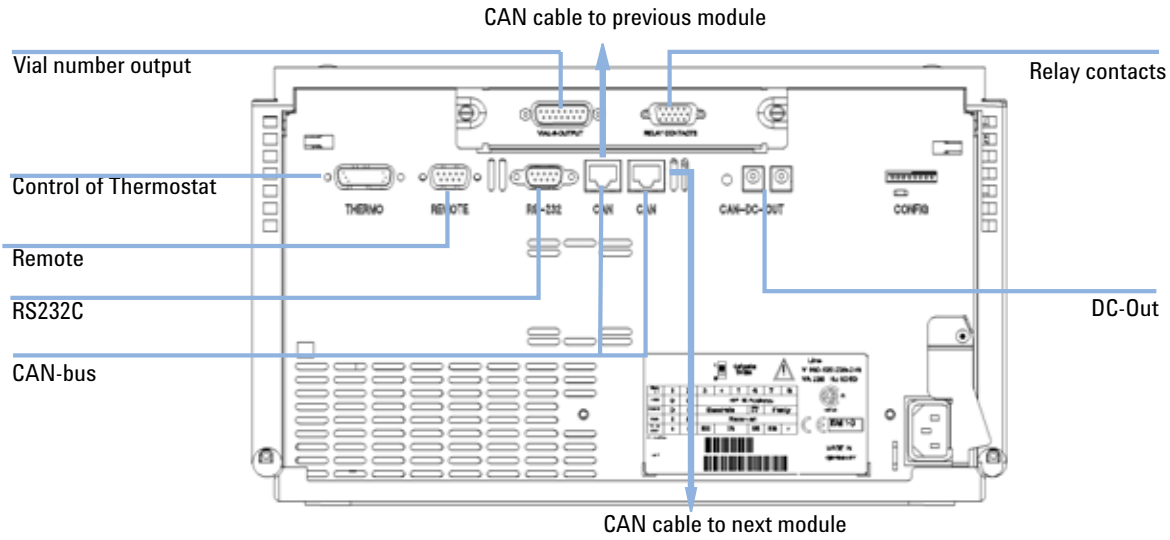


Figure 7 Autosampler Electrical Connections

2 Site Requirements and Specifications

Site Requirements 26
- Power Consideration 26
- Power Cords 27
- Bench Space 28
- Environment 28

Physical Specifications 29

Performance Specifications 30

Site Requirements

A suitable environment is important to ensure optimum performance of the autosampler.

Power Consideration

The autosampler power supply has wide-ranging capability (see Table 3 on page 29). Consequently there is no voltage selector in the rear of the autosampler. There are also no externally accessible fuses, because automatic electronic fuses are implemented in the power supply.

The thermostatted autosampler comprises two modules, the sampler (G1367B/D or G1377A) and the thermostat (G1330B). Both modules have a separate power supply and a power plug for the line connections. The two modules are connected by a control cable and both are turned on by the sampler module. The thermostat power supply has two externally accessible fuses.

WARNING

Damaged electronics

Disconnecting or reconnecting the sampler to thermostat cable when the power cords are connected to either of the two modules will damage the electronics of the modules.

➔ Make sure the power cords are unplugged before disconnecting or reconnecting the sampler to thermostat cable.

WARNING

Incorrect line voltage at the instrument

Shock hazard or damage of your instrumentation can result, if the devices are connected to a line voltage higher than specified.

➔ Connect your autosampler to the specified line voltage.

CAUTION

Unaccessable power plug.

In case of emergency it must be possible to disconnect the instrument from the power line at any time.

➔ Make sure the power connector of the instrument can be easily reached and unplugged.

➔ Provide sufficient space behind the power socket of the instrument to unplug the cable.

Power Cords

Your autosampler is delivered with a power cord which matches the wall socket of your particular country or region. The plug on the power cord which connects to the rear of the instrument is identical for all types of power cord.

WARNING

Electric shock

The absence of ground connection and the use of an unspecified power cord can lead to electric shock or short circuit.

➔ Never operate your instrumentation from a power outlet that has no ground connection.

➔ Never use a power cord other than the power cord designed for your region.

WARNING

Use of unsupplied cables

The use of cables which haven't been supplied by Agilent Technologies can lead to damage of the electronic components or personal injury.

➔ Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.

Bench Space

The autosampler dimensions and weight (see Table 3 on page 29) allow the instrument to be placed on almost any laboratory bench. The instrument requires an additional 2.5 cm (1.0 inch) of space on either side, and approximately 8 cm (3.1 inches) at the rear for the circulation of air, and room for electrical connections. Ensure the autosampler is installed in a horizontal position.

The thermostatted sampler dimensions and weight (see Table 3 on page 29) allow the instrument to be placed on almost any laboratory bench. The instrument requires an additional 25 cm (10 inches) of space on either side for the circulation of air, and approximately 8 cm (3.1 inches) at the rear for electrical connections. Ensure the autosampler is installed in a horizontal position.

If a complete Agilent 1200 Series system is to be installed on the bench, make sure that the bench is designed to carry the weight of all the modules. For a complete system including the thermostatted sampler it is recommended to position the modules in two stacks, see Figure 8 on page 38. Make sure that in this configuration there is 25 cm (10 inches) space on either side of the thermostatted sampler for the circulation of air.

Environment

Your autosampler will work within specifications at ambient temperatures and relative humidity as described in Table 3 on page 29.

CAUTION

Condensation within the autosampler

Condensation will damage the system electronics.

➔ Do not store, ship or use your autosampler under conditions where temperature fluctuations could cause condensation within the autosampler.

➔ If your autosampler was shipped in cold weather, leave it in its box and allow it to warm slowly to room temperature to avoid condensation.

Physical Specifications

Table 3 , Physical Specifications - sampler (G1367B/D / G1377A)

Type	Specification	Comments
Weight	15.5 kg (34.2 lbs)	
Dimensions (height × width × depth)	200 × 345 × 440 mm (8 × 13.5 × 17 inches)	
Line voltage	100 – 240 VAC, ±10%	Wide-ranging capability
Line frequency	50 or 60 Hz, ±5%	
Power consumption (apparent power)	300 VA	Maximum
Power consumption (active power)	200 W	Maximum
Ambient operating temperature	4 to 55 °C (41 to 131 °F)	
Ambient non-operating temperature	-40 to 70 °C (-4 to 158 °F)	
Humidity	< 95%, at 25 to 40 °C (77 to 104 °F)	Non-condensing
Operating Altitude	Up to 2000 m (6500 ft)	
Non-operating altitude	Up to 4600 m (14950 ft)	For storing the autosampler
Safety standards: IEC, CSA, UL	Installation Category II, Pollution Degree 2	

Performance Specifications

Table 4 Performance specifications Agilent 1200 Series High Performance Autosampler

Type	Specification
GLP features	Early maintenance feedback (EMF), electronic records of maintenance and errors
Communications	Controller-area network (CAN). RS232C, APG-remote standard, optional four external contact closures and BCD vial number output
Safety features	Leak detection and safe leak handling, low voltages in maintenance areas, error detection and display
Injection range	0.1 – 100 µl in 0.1 µl increments Up to 1500 µl with multiple draw (hardware modification required)
Precision	Typically < 0.25% RSD from 5 – 100 µl, Typically < 1% RSD from 1 – 5 µl variable volume
Pressure range	400 bar (5880 psi)
Sample viscosity range	0.2 – 5 cp
Sample capacity	2 × well plates (MTP) + 10 × 2 ml vials 108 x 2-mL vials in2 x 54 vial plate plus 10 additional 2 mL vials 30 x 6-mL vials in 2 x 15 vial plate plus 10 additional 2 mL vials 54 Eppendorf tubes (0.5/1.5/2.0mL) in 2 x 27 Eppendorf tube plate Also compatible with the Agilent 1200 Series sample capacity extension for further expansion of the sample capacity
Injection cycle time	Typically < 30 s using following standard conditions: Default draw speed: 200 µl/min Default eject speed: 200 µl/min Injection volume: 5 µl
Carry-over	Typically < 0.01% using the following conditions: Column: 125 x 4 mm Hypersil ODS, 5 µm Mobile phase: Water/Acetonitrile = 80/20 Flow rate: 1 ml/min Injection volume: 1 µl caffeine (1 mg/ml), 5 µl water to test carryover Outside wash of needle before injection: 20 sec with water using flush port

Table 5 Performance specifications Agilent 1200 Series High Performance Autosampler SL+

Type	Specification
GLP features	Early maintenance feedback (EMF), electronic records of maintenance and errors
Communications	Controller-area network (CAN). RS232C, APG-remote standard, optional four external contact closures and BCD vial number output
Safety features	Leak detection and safe leak handling, low voltages in maintenance areas, error detection and display
Injection range	0.1 – 40 µl in 0.1 µl increments Up to 100 µl with extended injection volume (hardware modification required)
Precision	Typically < 0.25% RSD from 5 – 40 µl, Typically < 0.5% RSD from 2 – 5 µl, Typically < 0.7% RSD from 1 – 2 µl volume. Measured with injections of benzylalcohol.
Pressure range	Up to 600 bar (8700 psi)
Sample viscosity range	0.2 – 5 cp
Sample capacity	2 × well plates (MTP) + 10 × 2 ml vials 108 x 2-mL vials in2 x 54 vial plate plus 10 additional 2 mL vials 30 x 6-mL vials in 2 x 15 vial plate plus 10 additional 2 mL vials 54 Eppendorf tubes (0.5/1.5/2.0mL) in 2 x 27 Eppendorf tube plate Also compatible with the Agilent 1200 Series sample capacity extension for further expansion of the sample capacity
Injection cycle time	Typically < 17 s using following standard conditions: Default draw speed: 100 µl/min Default eject speed: 100 µl/min Injection volume: 5 µl
Carry-over	Typically < 0.004% using the following conditions: Column: Agilent Zorbax SB-C18, 21x50mm 1.8µm (P/N 827700-902) Mobile Phase: A: H2O + 0.05% TFA, B: ACN+ 0.045 TFA Gradient: 0.1min 10% B, 3.1 min 90% B, 3.2 min 90 % B, 3.21 10 %B, 4.5min stop Flow rate: 0.5 ml/min Temperature: 25C Wavelength: 257 nm Sample : 1200 ng/ul Chlorhexidine (disolved in H2O with 0.1% TFA), 1ul injected and measure both on Agilent 6410 QQQ and G1315C DAD Wash solution: H2O with 0.1% TFA (5 sec)

Table 6 Performance Specifications Agilent 1200 Series Micro Well Plate Autosampler

Type	Specification
GLP features	Early maintenance feedback (EMF), electronic records of maintenance and errors
Communications	Controller-area network (CAN). RS232C, APG-remote standard, optional four external contact closures and BCD vial number output
Safety features	Leak detection and safe leak handling, low voltages in maintenance areas, error detection and display
Injection range	0.01– 8 µl in 0.01 µl increments with the small loop capillary 0.01–40 µl in 0.01 µl increments with the extended loop capillary
Precision	Typically < 0.5% RSD of peak areas from 5 – 40 µl, Typically < 1% RSD from 1 – 5 µl Typically < 3% RSD from 0.2 – 1 µl
Pressure range	up to 400 bar (5880 psi)
Sample viscosity range	0.2 – 5 cp
Sample capacity	2 × well-plates (MTP) + 10 × 2 ml vials 108 x 2-mL vials in 2 x 54 vial plate plus 10 additional 2 mL vials 30 x 6-mL vials in 2 x 15 vial plate plus 10 additional 2 mL vials 54 Eppendorf tubes (0.5/1.5/2.0 mL) in 2 x 27 Eppendorf tube plate
Injection cycle time	Typically < 30 s using following standard conditions: Default draw speed: 4 µl/min Default eject speed: 10 µl/min Injection volume: 0.1 µl
Carry-over	Typically < 0.05% using the following conditions: Column: 150 x 0.5 mm Hypersil ODS, 3 µm Mobile phase: Water/Acetonitrile = 85/15 Column Flow rate: 13 µl/min Injection volume: 1 µl caffeine (=25 ng caffeine), 1 µl water to test carryover Outside wash of needle before injection: 20 sec with water using flush port

3 Installing the Autosampler

Unpacking the Sampler 34
Damaged Packaging 34
Delivery Checklist 34
Accessory Kits 34
Optimizing the Stack Configuration 37
Installing the Autosampler, , , , 42
Installing a Thermostatted Autosampler, , , 45
Flow Connections to the Sampler, 49
Installing the Sample Tray 51
Transporting the Sampler, 53

Unpacking the Sampler

NOTE If you need to ship the autosampler at a later date, always use the shipping protection foam parts (see "Transporting the Sampler," on page 53).

Damaged Packaging

Upon receipt of your module, inspect the shipping containers for any signs of damage. If the containers or cushioning material are damaged, save them until the contents have been checked for completeness and the instrument has been mechanically and electrically checked. If the shipping container or cushioning material is damaged, notify the carrier and save the shipping material for the carrier's inspection.

Delivery Checklist

Ensure all parts and materials have been delivered with the autosampler. For this compare the shipment content with the checklist included in each instrument box. Please report missing or damaged parts to your local Agilent Technologies sales and service office.

Accessory Kits

Each shipment contents an Accessory kit with the necessary tools to install the system and to have an operating system.

- The Accessory kit (G1367-68705) shown in Table 7 on page 35 is shipped with the (G1367B/D) high performance autosampler and SL+ version.
- The Accessory kit (G1377-68705) shown in Table 8 on page 35 is shipped with the (G1377A) micro well plate autosampler.

Table 7 High Performance Autosampler and SL+ version Accessory Kit Contents G1367-68705

Description	Quantity	Part Number
Capillary sampler-column (380 mm, 0.17 mm ID)	1	**01090-87306**
96 well plate 0.5 ml, PP (pack of 10)	1	**5042-1386**
Tubing assembly	1	**5063-6527**
Filter kit	1	**5064-8240**
CAN cable, 1 m	1	**5181-1519**
Vials, screw cap 100/pk	1	**5182-0716**
Blue screw caps 100/pk	1	**5182-0717**
Hex key 9/64 inch (for injection-valve screws)	1	**8710-0060**
Wrench, 4mm both ends	2	**8710-1534**
Rheotool socket wrench 1/4 inch	1	**8710-2391**
Hex key 4.0 mm, 15 cm long, T-handle	1	**8710-2392**
Hex key 9/64 inch, 15 cm long, T-handle	1	**8710-2394**
Hex key 2.0 mm	1	**8710-2438**
Air channel adapter	1	**G1329-43200**
Capillary WPS to column (250 mm, 0.17 mm ID)	1	**G1367-87304**
WPS leak kit	1	**G1367-60006**
Tool for micro seat capillary	1	G1377-44900

Table 8 Micro well plate Autosampler Accessory Kit G1377-68705

Description	Quantity	Part Number
96 well plate 0.5 ml, PP (pack of 10)	1	**5042-1386**
Tubing assembly	1	**5063-6527**
Filter kit	1	**5064-8240**
CAN cable, 1 m	1	**5181-1519**
Vials, screw cap 100/pk	1	**5182-0716**

Table 8 Micro well plate Autosampler Accessory Kit G1377-68705

Description	Quantity	Part Number
Blue screw caps 100/pk	1	**5182-0717**
Hex key 9/64 inch (for injection-valve screws)	1	**8710-0060**
Wrenches 1/4 – 5/16 inch	2	**8710-0510**
Wrench 4.0 mm open end	1	**8710-1534**
Rheotool socket wrench 1/4 inch	1	**8710-2391**
Hex key 4.0 mm, 15 cm long, T-handle	1	**8710-2392**
Hex key 9/64 inch, 15 cm long, T-handle	1	**8710-2394**
Hex key 2.5 mm, 15 cm long, straight handle	1	**8710-2412**
Hex key 2.0 mm	1	**8710-2438**
Torque adapter	1	**G1315-45003**
Air channel adapter	1	**G1329-43200**
Capillary sampler-column (500 mm, 0.05 mm ID)	1	**G1375-87304**
40 µl Loop capillary	1	**G1377-87300**
WPS leak kit	1	**G1367-60006**
Seat capillary (150 mm, 0.075 mm ID)	1	**G1367-87316**
Tool for micro seat capillary	1	**G1377-44900**

Optimizing the Stack Configuration

If your autosampler is part of a system, you can ensure optimum performance, ensuring minimum delay volume by installing the following configuration. Figure 8 on page 38 and Figure 9 on page 39 show the configuration recommended for the sampler. Figure 10 on page 40 and Figure 11 on page 41 show the configuration recommended for the thermostatted sampler.

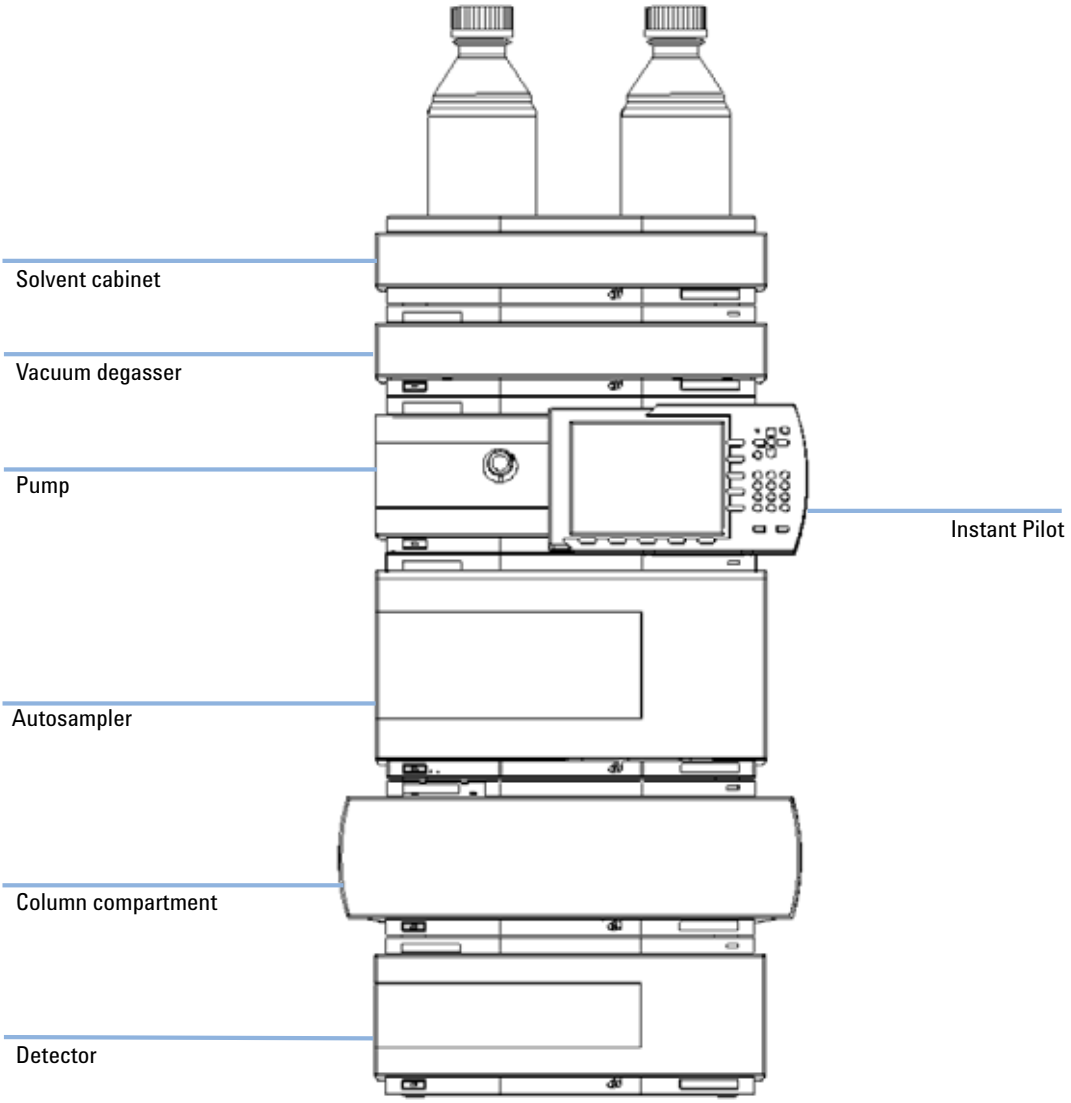


Figure 8 Recommended Stack Configuration - Well Plate Autosampler (Front View)

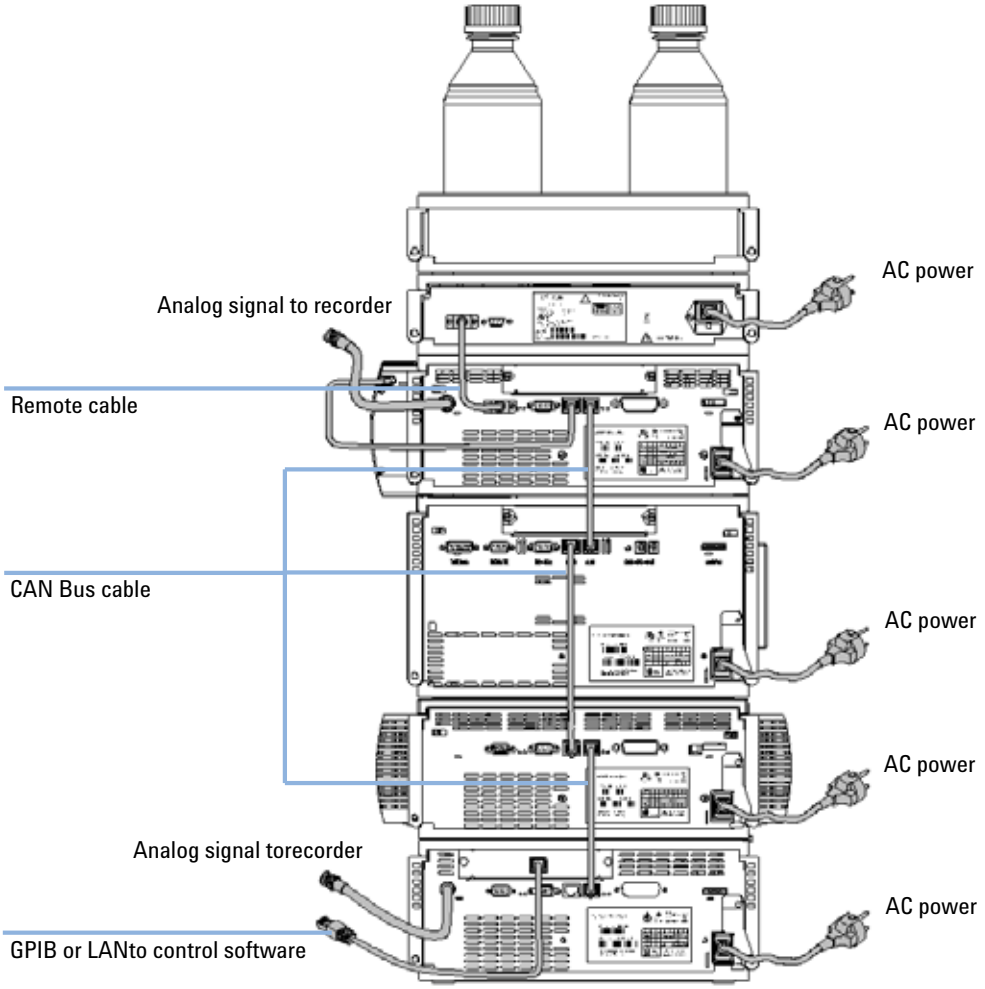


Figure 9 Recommended Stack Configuration - Well Plate Autosampler (Rear View), ,

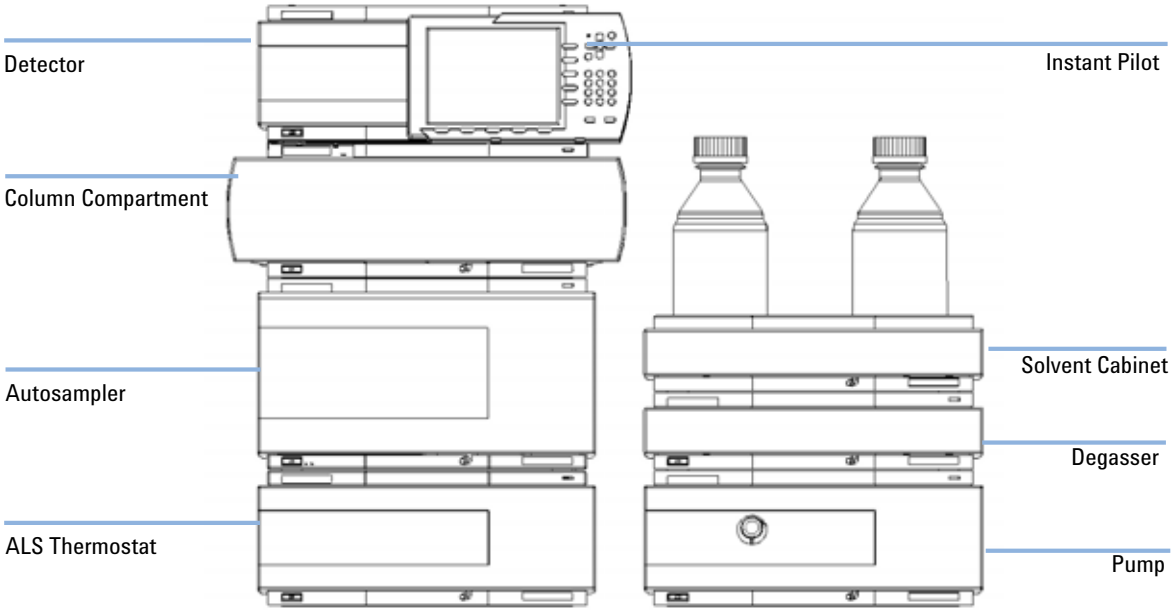


Figure 10 Recommended Stack Configuration - Thermostatted Autosampler (Front View)

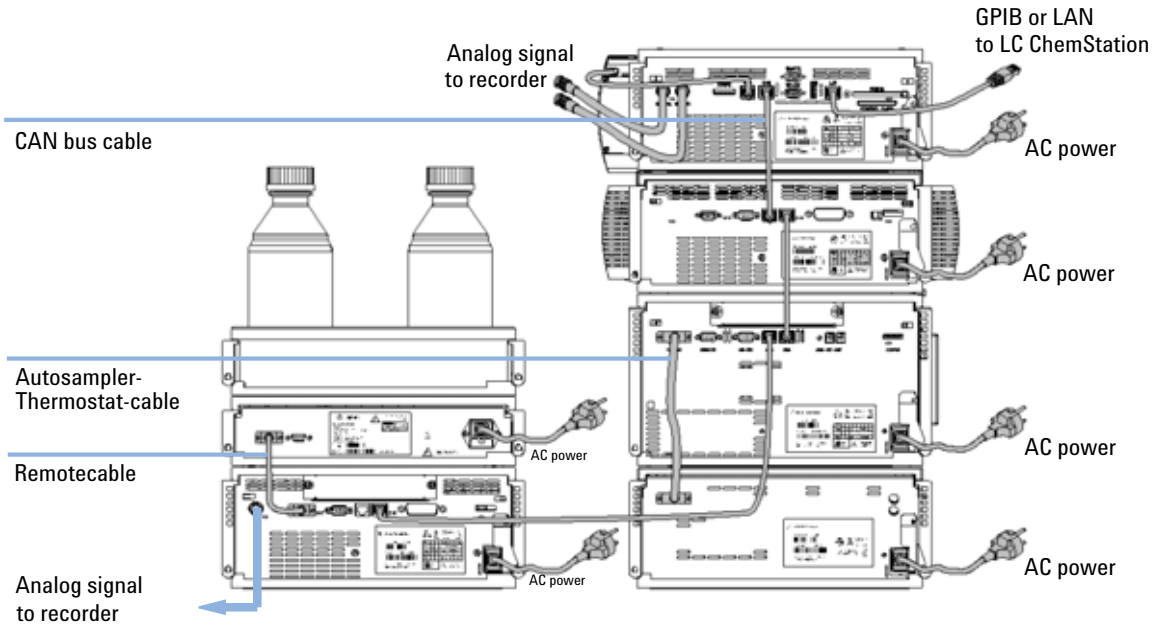


Figure 11 Recommended Stack Configuration - Thermostatted Autosampler (Rear View),

Installing the Autosampler, , , ,

Parts required

#	Description
1	Sampler Power cord.

Preparations

- Locate bench space Provide power connections Unpack the sampler

WARNING

Instruments are partially energized when switched off

The power supplies still use some power, even if the power switch on the front panel is turned off.

➔ To disconnect the thermostatted autosampler from line power, unplug the power cord from the autosampler and the ALS thermostat.

➔ Make sure that it is always possible to access the power plug.

WARNING

Personal injury

To avoid personal injury, keep fingers away from the needle area during autosampler operation.

➔ Do not attempt to insert or remove a vial or a plate when the needle is positioned.

CAUTION

"Defective on arrival" problems

If there are signs of damage to the autosampler, please do not attempt to install the autosampler. Inspection by Agilent is required to evaluate if the instrument is in good condition or damaged.

➔ Notify your Agilent sales and service office about the damage.

➔ An Agilent service representative will inspect the instrument at your site and initiate appropriate actions.

1 Install the LAN interface board in the sampler (if required).

2 Remove the adhesive tape which covers the side and front doors.

3 Open the front door and remove the left side door.

4 Remove the transport protection foam.

5 Re-install the corrugated waste tube in the plastic port.

6 Re-install the left side door (take care of the magnet at the back).

7 Place the autosampler in the stack or on the bench in all horizontal position.

8 Ensure the power switch at the front of the sampler is OFF.

9 Connect the power cable to the power connector at the rear of the sampler.

10 Connect the CAN cable to the other Agilent 1200 modules.

11 If a Agilent ChemStation is the controller, connect the LAN connection to the LAN interface

12 Connect the APG remote cable (optional) for non Agilent 1200 Series instruments.

13 Ensure the side panel is correctly installed.

14 Turn ON power by pushing the button at the lower left hand side of the sampler.

15 Close the front door. The exhaust fan will turn ON and remove the vapor from the tray compartment. After 1-2 minutes the sampler will start the hardware initialisation process. At the end of this process the status LED should be off.

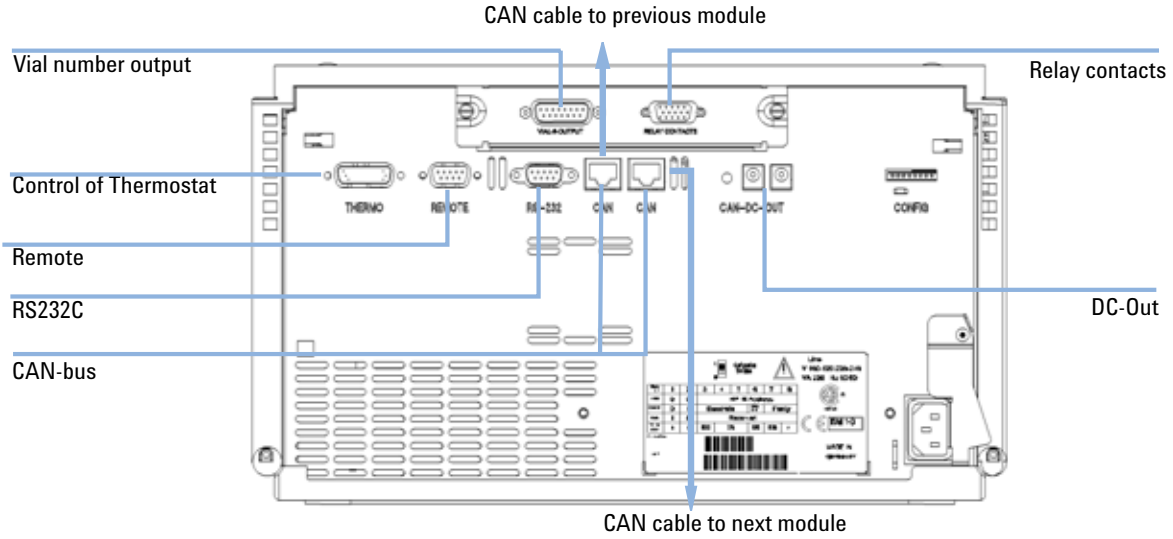


Figure 12 Cable Connections

NOTE The sampler is turned ON when the line power switch is pressed and the green indicator lamp is illuminated. The sampler is turned OFF when the line power switch is protruding and the green light is OFF.

Installing a Thermostatted Autosampler, , ,

Parts required

#	Description
1	Sampler and thermostat Power cord.

Preparations

- Locate bench space Provide power connections Unpack the sampler and the thermostat

WARNING

Instrument is partially energized when switched off

The power supply still uses some power, even if the power switch at the front of the panel is turned off.

➔ To disconnect the sampler from the line, unplug the power cord.

WARNING

Damaged electronics

Disconnecting or reconnecting the sampler to thermostat cable when the power cords are connected to either of the two modules will damage the electronics of the modules.

➔ Make sure the power cords are unplugged before disconnecting or reconnecting the sampler to thermostat cable.

WARNING

Damage through condensation

If the condensation tube is located in liquid the condensed water cannot flow out of the tube and the outlet is blocked. Any further condensation will then remain in the instrument. This may damage the instruments electronics.

➔ Make sure that the condensation tube is always above the liquid level in the vessel.

WARNING

Personal injury

To avoid personal injury, keep fingers away from the needle area during autosampler operation.

➔ Do not attempt to insert or remove a vial or a plate when the needle is positioned.

---

1 Place the thermostat on the bench.,
2 Remove the front cover and route the condensation drain tube to the waste bottle.

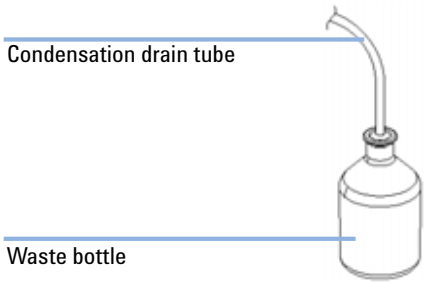


Figure 13 Condensation leak outlet

3 Install the LAN interface board in the sampler (if required).
4 Remove the adhesive tape which covers the side and front doors.
5 Open the front door and remove the left side door.
6 Remove the transport protection foam.
7 Re-install the corrugated waste tube in the plastic port.
8 Re-install the left side door (take care of the magnet at the back).
9 Place the sampler on top of the thermostat. Make sure that the sampler is correctly engaged in the thermostat locks.

10 Remove the tray and the plastic cover from the tray base, place the air channel adapter into the sampler tray base. Make sure the adapter is fully pressed down. This assures that the cold airstream from the thermostat is correctly guided to the tray area of the well plate sampler.

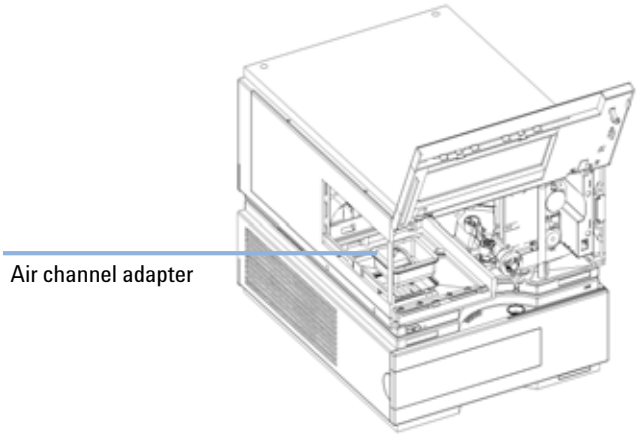


Figure 14 Installation of Thermostat and Autosampler

11 Re-install the tray.

12 Ensure the power switch on the front of the sampler is 0FF and the power cables are disconnected.

13 Connect the cable between the sampler and the thermostat, see Figure 15 on page 48.

14 Connect the power cables to the power connectors.

15 Connect the CAN cable to other Agilent 1200 series modules.

16 If a Agilent ChemStation is the controller, connect the LAN connection to the LAN interface

17 Connect the APG remote cable (optional) for non Agilent 1200 Series instruments.

18 Ensure the side panel is correctly installed.

19 Turn ON power by pushing the button at the lower left hand side of the sampler.

20 Close the front door.

The exhaust fan will turn ON and remove the vapor from the tray compartment. After 1-2 minutes the sampler will start tile hardware initialisation process. At the end of this process the status LED should be off.

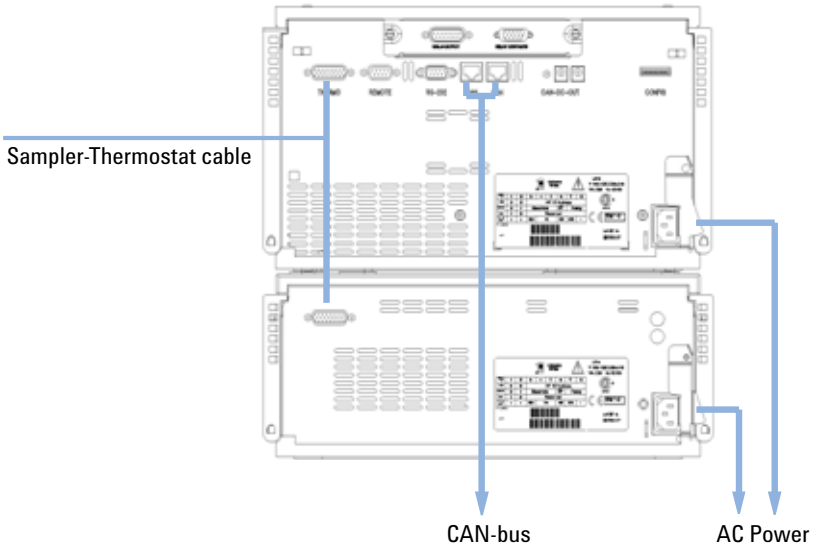


Figure 15 Connection at the rear of thermostatted Autosampler

NOTE The sampler is turned ON when the line power switch is pressed and the green indicator lamp is illuminated. The sampler is turned 0FF when the line power switch is protruding and the green light is 0FF.

Flow Connections to the Sampler,

Parts required

#	Description
1	Parts from the accessory kits, see “Accessory Kits” on page 34

Preparations

- Sampler is installed in the LC system

WARNING

When opening capillary or tube fittings solvents may leak out.

The handling of toxic and hazardous solvents and reagents can hold health risks.

➔ Please observe appropriate safety procedures (for example, goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the solvent vendor, especially when toxic or hazardous solvents are used.

1. Connect the pump outlet capillary to port 1 of the injection valve.
2. Connect column-compartment inlet capillary to port 6 of the injection valve.
3. Connect the corrugated waste tube to the seat adapter and the solvent waste from the leak plane.
4. Ensure that the waste tube is positioned inside the leak channel.
5. Drive the tube from the peristaltic flush pump to the solvent bottle in the solvent cabinet
6. Seat capillary: see recommendations in “Choice of Seat Capillary” on page 107

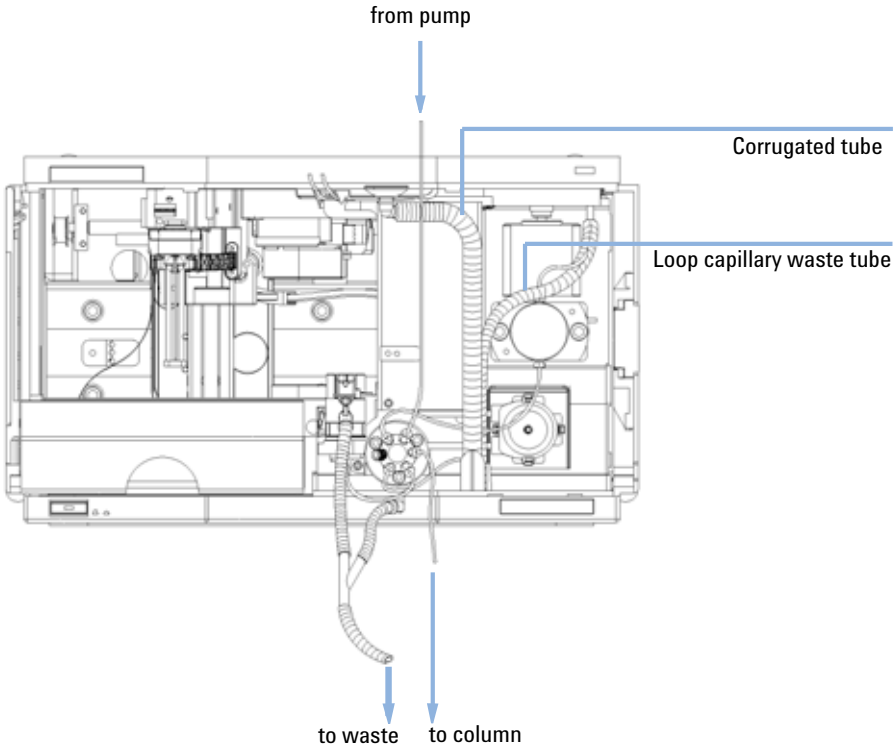


Figure 16 Hydraulic Connections

Installing the Sample Tray

1. Press the bottom on the right side to release the front door.
2. Lift the front door.
3. Load the sample tray with sample well plates and vials as required.
4. Slide the sample tray into the autosampler so that the rear of the sample tray is seated firmly against the rear of the sample-tray area.
5. Press the front of the sample tray down to secure the tray in the autosampler.

NOTE If the tray pops out of position the air channel adapter is not correctly inserted.

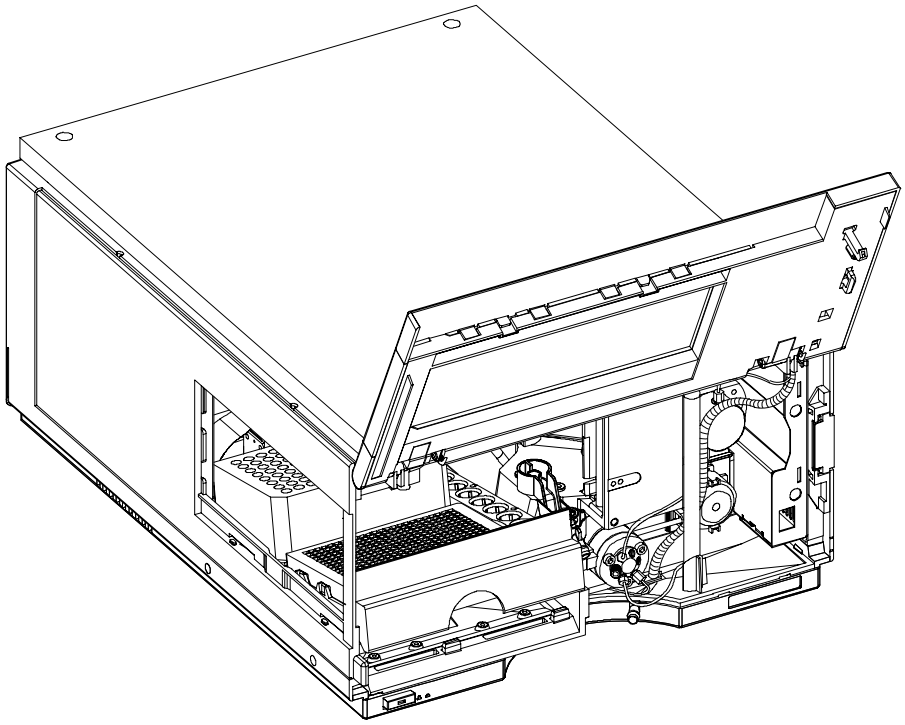


Figure 17 Installing the Sample Tray

Transporting the Sampler,

When moving the autosampler inside the laboratory, no special precautions are needed. However, if the autosampler needs to be shipped to another location via carrier, ensure:

- The transport assembly is in the park position. Use the Lab Monitor and Diagnostic software or the Instant Pilot for this command.
- The vial tray and the sample transport mechanism is secured with the transport protection foam.

4 Configuring the Autosampler

Autosampler Control and Electronics 56
Position and Movement Sensors, 57
Microtiter Plate Board (MTP), 58
Autosampler-Specific Electronics 59
Firmware Description, 63
Optional Interface Boards, , 66
BCD Board 66
LAN Communication Interface Board, , , 69
Agilent 1100/1200 Series Interfaces, 71
Setting the 8-bit Configuration Switch, , , 77
The Main Power Supply Assembly 82

Autosampler Control and Electronics

The Microtiter Plate Board (MTP) controls the vial-transport mechanism, sampling needle, metering unit, and high-speed injection valve. These devices are controlled by a versatile electronics design based upon a 68000 family processor which also contains battery backup RAM, flash ROM, a real time clock, and several communications options.

Position and Movement Sensors,

Position sensing of movement of autosampler components is done by sensors on the sample transport and sampling unit flex boards. The following sensors are used:

Table 9 Sample Transport Flex Board

Sensor Type	Number of Sensors	Position / Movement Sensed
Reflection Sensor	9	Vial tray identification
Reflection Sensor	4	Transport assembly Initialization

Table 10 Sampling Unit Flex Board

Sensor Type	Number of Sensors	Position / Movement Sensed
IR light sensor	1	Metering device home (reference) position
Reflection sensor	2	Needle end lock positions
Microswitch	2	Valve switching

Table 11 SLS Board

Sensor Type	Number of Sensors	Position / Movement Sensed
Hall sensor	2	Front door closed

Table 12 MTP Board

Sensor Type	Number of Sensors	Position / Movement Sensed
Hall sensor	2	Left side cover closed

Microtiter Plate Board (MTP),

Common Electronics

A common electronics and firmware design is used for all Agilent 1200 Series LC modules. This core design provides a basic set a functions for each module.

Table 13 Common Electronics

Core-processor	MC68332
Core-memory	The core unit has 3 memory blocks: 2 MB SRAM 1 MB memory 128 KB NVRAM 24*8 serial NVRAM from the real time clock
Communication Interfaces	The core unit supports direct the following interfaces: CAN bus RS232 Remote MIO (LAN)

, ASIC — Application-Specific Integrated Circuit

The application-specific integrated circuit (ASIC) provides interfacing to external devices through drivers, including CAN, APG Remote. It is directly connected to the four control LEDs located near the connectors on this board and the 8-bit configuration switch which is used to configure the address for the communication, baud rate for RS-232 transfer, and so on. Also, the ASIC controls and drives module specific functions and reads static status signals.

Leak Sensor

Solvent leaking from the autosampler cools down the PTC. This changes the resistance of the PTC and generates a leak signal.

, Fan Drive

The fan speed (two speeds are possible) is controlled by the main processor according to the internal heat distribution inside the module. The fan provides a PWM signal which is proportional to the revolution.

, Onboard Battery

An onboard lithium battery buffers the electronic memories when the module is turned off. For safety information on lithium batteries see "Lithium Batteries Information, , ," on page 305.

Autosampler-Specific Electronics

The autosampler specific functions provided by the electronics are:

- Closed loop control of three axis vial handling servos
- Electric valve control
- Needle unit control
- Metering device control
- Peristaltic pump control

Transport Unit Control,

The transport drive electronics use current-controlled pulse-width modulation (PWM) to drive the X, Z, motors in closed-loop servo control mode. Dedicated electronics in the ST L6506 provide the current-control loop. Commutation is done in FPGA logic. The ST L6201 SMT output drivers are used for all three stepper motors. Motor encoder signals are connected to the ASIC where the encoder quadrature decoded clock and the up/down signal are used in the FPGA to provide instantaneous stepper motor commutation with respect to the motor rotor position.

Wiring between the autosampler main board (ASM) and the motors and encoders uses a flat-band cable (64 pin) and a flex board on which 13 reflection light sensors are located. 9 light sensors are used for vial-tray identification and four for decoding of the initialization position.

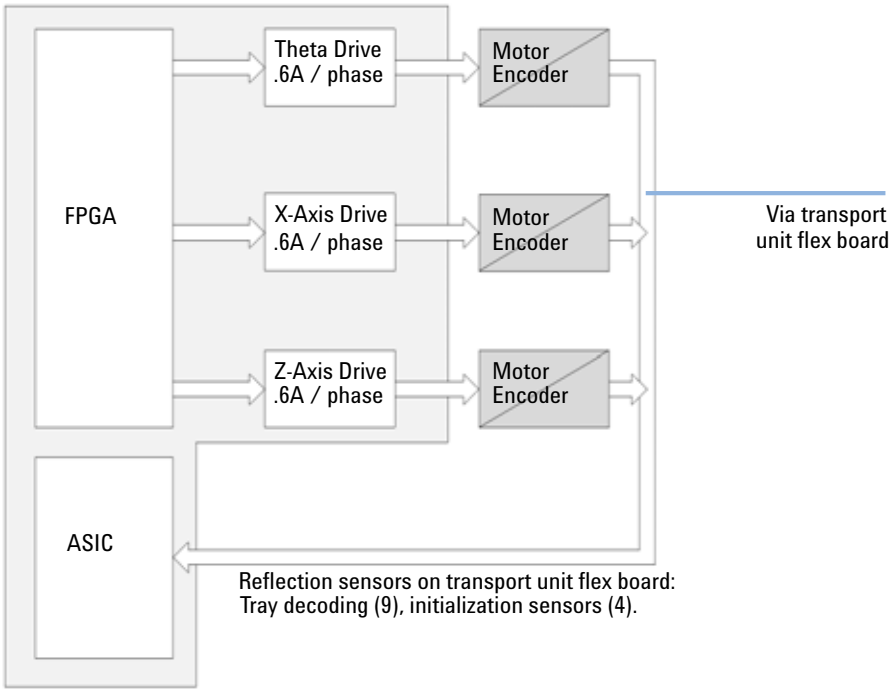


Figure 18 Transport unit control

Sampling Unit Control,

Needle lock, metering device valve and peristaltic pump motors are driven by controlled pulse-width modulation in the same way as the ST L6506 (see "Transport Unit Control," on page 59). The motors require fast speed but do not require precise position control. Therefore, a closed loop servo system is not required. Commutation is done in FPGA logic. The needle lock, metering device and valve motors use ST L6203 output drivers to deliver the higher currents required for fast movement or high torque. The peristaltic pump drive is built with a ST L6201 circuit.

The movement sensing of the valve motor is done by two microswitches. Two reflection light sensors are used to detect the end positions of the needle lock device. One photo sensor is required to detect the home position of the metering device. All the sensors are mounted on one flex board. The flex

board and motors are connected to the sampling unit distribution board (SUD). The SUD board is connected to the Microtiter Plate Board (MTP) via a flat-band cable (64 pin).

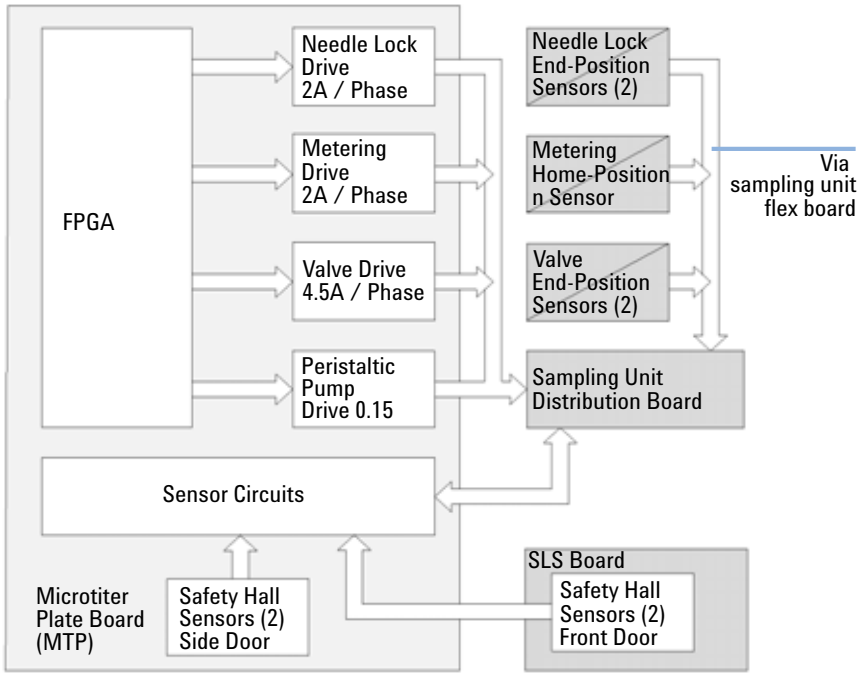

FPGA
Needle Lock Drive 2A / Phase
Metering Drive 2A / Phase
Valve Drive 4.5A / Phase
Peristaltic Pump Drive 0.15
Needle Lock End-Position Sensors (2)
Metering Home-Position n Sensor
Valve End-Position Sensors (2)
Via sampling unit flex board
Sampling Unit Distribution Board
Sensor Circuits
SLS Board
Safety Hall Sensors (2) Front Door
Microtiter Plate Board (MTP)
Safety Hall Sensors (2) Side Door

Figure 19 Sampling unit control

Safety Lock Sensor Board (SLS)

Two hall sensors detect correct closure of the front door (needle arm movement is interrupted, if front door is open). The front door is locked by an electric magnet.

Unlocking the front door is done by pushing the button on the right side or switching the power off/on.

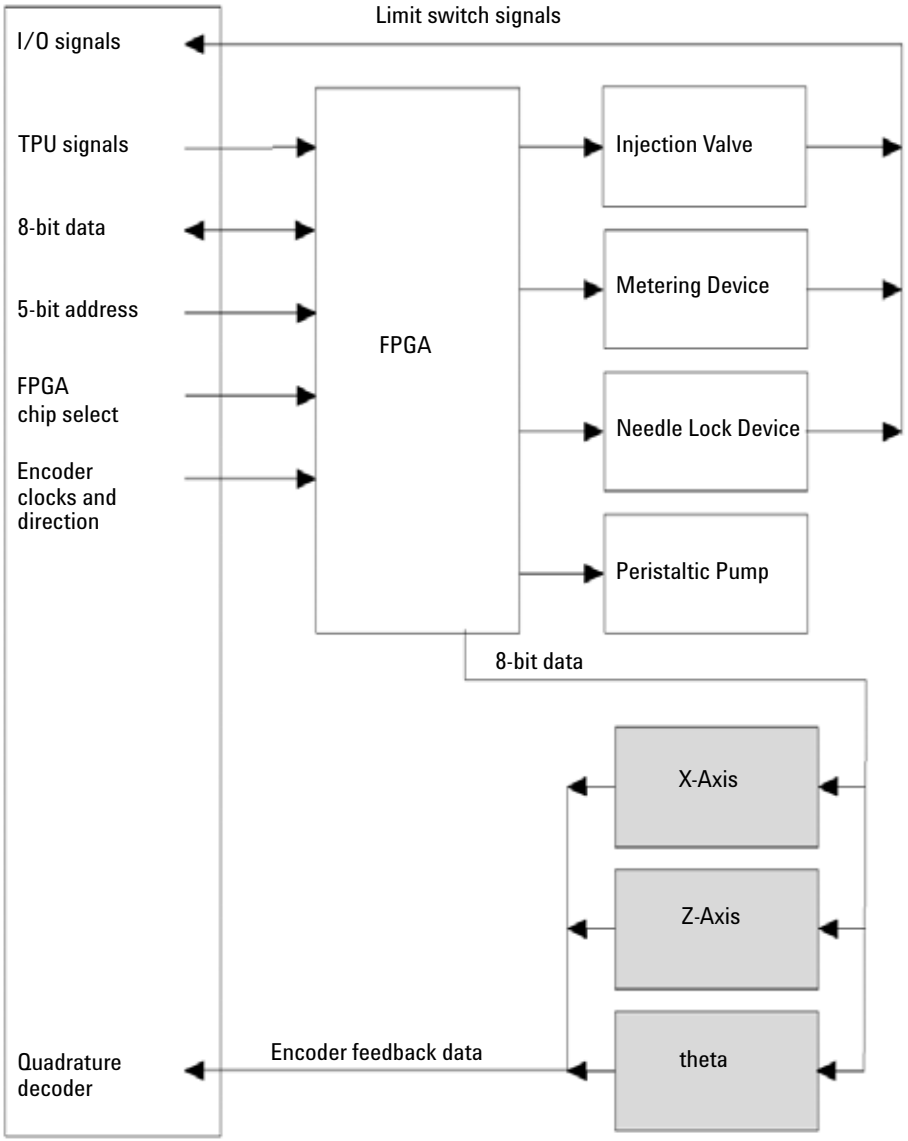


Figure 20 Autosampler block diagram

Firmware Description,

The firmware of the instrument consists of two independent sections:

- a non-instrument specific section, called *resident system*,
- an instrument specific section, called *main system*.

Resident System,

This resident section of the firmware is identical for all Agilent 1200 series modules. Its properties are:

- the complete communication capabilities (CAN, LAN and RS-232C),
- memory management,
- ability to update the firmware of the 'main system'.

Main System,

Its properties are:

- the complete communication capabilities (CAN, LAN and RS-232C),
- memory management,
- ability to update the firmware of the 'resident system'.

In addition the main system comprises the instrument functions that are divided into common functions like

- run synchronization through APG remote
- error handling,
- diagnostic functions,
- or module specific functions like

  internal events such as lamp control, filter movements,

  raw data collection and conversion to absorbance.

Firmware Updates,

Firmware updates can be done using your user interface:

- PC and Firmware Update Tool with local files on the hard disk or.

- Instant Pilot (G4208A) with files from a USB Flash Disik or
- handheld control module (G1323A/B) with files from a PC-card.

The file naming conventions are:

PPPP_RVVV_XX.dlb, where

PPPP is the product number, for example, 1315AB for the G1315A/B DAD,

R the firmware revision, for example, A for G1315B or B for the G1315C DAD,

VVV is the revision number, for example 102 is revision 1.02

XX is the build number of the firmware

For instructions on firmware updates refer to section *Replacing Firmware* in chapter *Maintenance* or use the documentation provided with the *Firmware Update Tools*, .

NOTE Update of main system can be done in the resident system only. Update of the resident system can be done in the main system only.

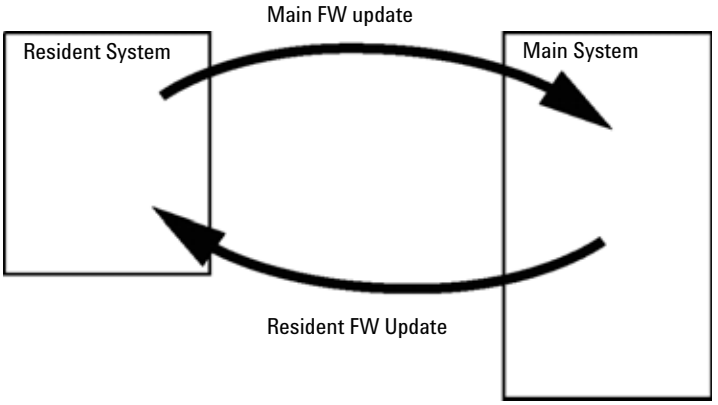


Figure 21 Firmware Update Mechanism

NOTE

Some 1200 series modules are limited in downgrading due to their main board version or their inititial firmware revision. For example, a G1315C DAD SL cannot be downgraded below firmware revision B.01.02 or to a A.xx.xx.

Some 1200 series SL-modules like the G1312B, G1314C, G1316B can be downgraded to lower versions by converting the module into a lower version, for example a G1312B SL pump is converted to a G1312A and looses the features of the G1312B.

All these specific informations are described in the documentation provided with the firmware update tools.

The firmware update tools, firmware and documentation are available from the Agilent web.

- http://www.chem.agilent.com/scripts/cag_firmware.asp.

Optional Interface Boards, ,

The Agilent 1200 Series modules have one optional board slot that allows addition of an interface board to the modules.

Table 14 Optional Interface Boards

Description	Part Number
BCD Board	G1351-68701
Fuse 250 mA (four are on the board),	2110-0004
LAN Communication Interface Board	G1369A or G1369-60001

BCD Board

The BCD board provides a BCD output for the bottle number of the Agilent 1200 Series autosampler and four external contacts. The external contact closure contacts are relay contacts. The maximum settings are: 30 V (AC/DC); 250 mA (fused).

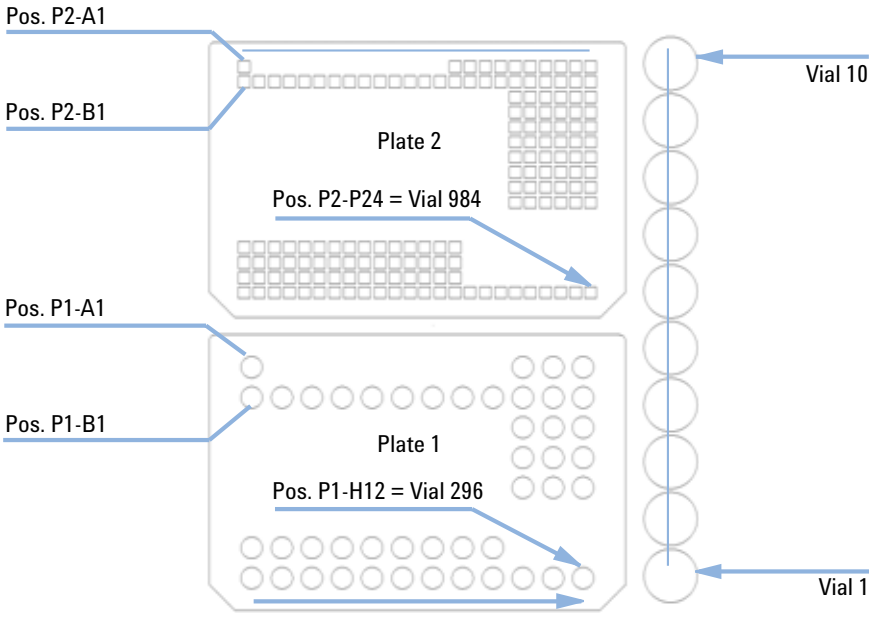


Figure 22 BCD output for the well plates

The BCD vial output number is derived from a formula (see below) that take plate type, plate position and well position into acount.

BCDValue (plate 1) = (Row-1) * Max. Col + Col + 200

BCDValue (plate 2) = (Row-1) * Max. Col + Col + 600

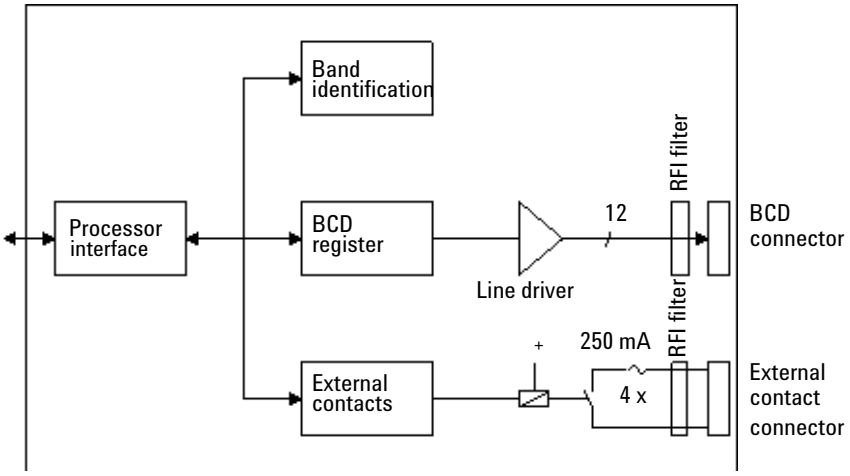


Figure 23 Block Diagram BCD Board

There are general purpose cables available to connect the BCD output, see "BCD Cables," on page 294 and the external outputs, see "External Contact Cable," on page 298 to external devices.

Table 15 Detailed connector layout (1200)

Pin	Signal name	BCD digit
1	BCD 5	20
2	BCD 7	80
3	BCD 6	40
4	BCD 4	10
5	BCD 0	1
6	BCD 3	8
7	BCD 2	4
8	BCD 1	2
9	Digital ground	
10	BCD 11	800
11	BCD 10	400

Table 15 Detailed connector layout (1200)

Pin	Signal name	BCD digit
12	BCD 9	200
13	BCD 8	100
14	not connected	
15	+ 5 V	

LAN Communication Interface Board, , ,

The Agilent 1100/1200 Series modules have one optional board slot that allows to add an interface board to the modules. Some modules do not have this interface slot. Refer to "Agilent 1100/1200 Series Interfaces," on page 71 for details.

Description	Part Number
LAN Communication Interface Board	**G1369A** **G1369-60001**

NOTE One board is required per Agilent 1200 stack. It is recommended to add the LAN board to the detector with highest data rate.

NOTE For the configuration of the G1369A Lan Communication Interface card refer to its documenation.

The following cards can be used with the Agilent 1200 Series modules.

Table 16 LAN Boards

Type	Vendor	Supported networks
G1369A G1369-60001	Agilent Technologies	Fast Ethernet, Ethernet/802.3, RJ-45 (10/100Base-TX) recommended for re-ordering
J4106A (*)	Hewlett Packard	Ethernet/802.3, RJ-45 (10Base-T(
J4105A (*)	Hewlett Packard	Token Ring/802.5, DB9, RJ-45 (10Base-T)
J4100A (*)	Hewlett Packard	Fast Ethernet, Ethernet/802.3, RJ-45 (10/100Base-TX) + BNC (10Base2)

NOTE These cards (*) may be no longer orderable. Minimum firmware of these Hewlett Packard JetDirect cards is A.05.05.

Table 17 Recommended LAN cables

Cross-over network cable (shielded, 3 m long), (for point to point connection)	**5023-0203**
Twisted pair network cable (shielded, 7 m long) (for hub connections)	**5023-0202**

Agilent 1100 / 1200 Series Interfaces,

The Agilent 1100/1200 Series modules provide the following interfaces:

Module	CAN	LAN / BCD (optional)	LAN (on-board)	GPIB	RS-232	Analog	APG Remote	Special
Pumps								
G1310A ISO G1311A QUAT G1312A BIN G2226A NANO	2	Yes	No	Yes	Yes	1	Yes	
G1312B BIN SL	2	Yes	No	Yes	Yes	1	Yes	
G1361A PREP	2	Yes	No	No	Yes	No	Yes	CAN-DC- OUT for CAN slaves
Samplers								
G1313A STD	2	Yes	No	Yes	Yes	No	Yes	
G1329A STD G1329B STD SL G2260A PREP	2	Yes	No	Yes	Yes	No	Yes	THERMOSTAT for G1330A / B
G1364A FRC G1367A / B / C / D WPS G1377A µWPS G2258A D-LOOP	2	Yes	No	Yes	Yes	No	Yes	THERMOSTAT for G1330A / B CAN-DC- OUT for CAN slaves
Detectors								
G1314A / B VWD	2	Yes	No	Yes	Yes	1	Yes	
G1314C VWD SL	2	Yes	No	No	Yes	1	Yes	
G1315A / B DAD G1365A / B MWD	2	Yes	No	Yes	Yes	2	Yes	

Module	CAN	LAN / BCD (optional)	LAN (on-board)	GPIB	RS-232	Analog	APG Remote	Special
G1315C DAD SL G1365C MWD SL G1315D DAD G1365D MWD	2	No	Yes	No	Yes	2	Yes	
G1321A FLD G1362A RID	2	Yes	No	Yes	Yes	1	Yes	
G4280A ELSD	No	No	NO	No	Yes	Yes	Yes	EXT Contact AUTOZERO
Others								
G1316A TCC	No	No	No	A	Yes	No	Yes	
G1316B TCC SL	No	No	No	A	Yes	No	Yes	
G1322A DEG	No	No	No	No	No	No	Yes	AUX
G1379A DEG	No	No	No	No	Yes	No	No	AUX
G4240A CHIP CUBE	2	Yes	No	No	Yes	No	Yes	CAN-DC- OUT for CAN slaves THERMOSTAT for G1330A / B (NOT USED

- CAN connectors as interface to other Agilent 1200 Series modules,
- GPIB connector as interface to the Agilent ChemStation,
- RS-232C as interface to a computer,
- REMOTE connector as interface to other Agilent products,
- analog output connector(s) for signal output, and
- interface slot for specific interfacing (external contacts, BCD, LAN and so on).

For identification and location of the connectors, see the module manual.

NOTE Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.

CAN, ,

The CAN is intermodule communication interface. It is a 2-wire serial bus system supporting high speed data communication and real-time requirement.

NOTE

If a Agilent 1100/1200 series detector (DAD/MWD/FLD/VWD/RID) is in the system, the LAN should be connected to the DAD/MWD/FLD/VWD/RID (due to higher data load). If no Agilent detector detector is part of the system, the LAN interface should be installed in the pump or autosampler.

LAN

The 1100/1200 modules have either an interface slot for an LAN card (e.g. Agilent G1369A LAN Interface) or they have an on-board LAN interface (e.g. detectors G1315C/D DAD and G1365C/D MWD). This interface allows the control of the module/system via a connected PC with the appropriate control software (e.g. Agilent ChemStation).

GPIB, ,

The GPIB connector is used to connect the module with a computer. The address and control switches next to the GPIB connector determine the GPIB address of your module. The switches are preset to a default address and recognized by the operating software from Agilent Technologies.

Table 18 GPIB Default Addresses

Pump	22	DAD/MWD	26
FLD	23	Column Compartment	27
VWD	24	Autosampler	28
Agilent 8453A	25	RID	29

RS-232C (Serial), ,

The RS-232C connector is used to control the module from a computer through RS-232C connection, using the appropriate software. This connector can be configured with the configuration switch module next to the GPIB connector.

The RS-232C is designed as DCE (data communication equipment) with a 9-pin male SUB-D type connector. The pins are defined as:

Table 19 RS-232C Connection Table

Pin	Direction	Function
1	In	DCD
2	In	RxD
3	Out	TxD
4	Out	DTR
5		Ground
6	In	DSR
7	Out	RTS
8	In	CTS
9	In	RI

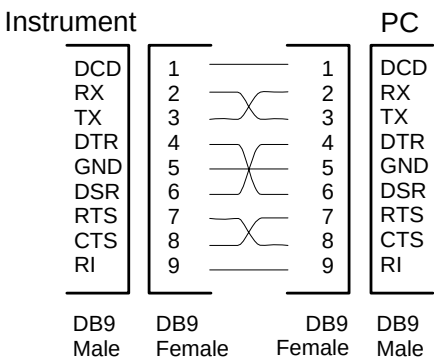


Figure 24 RS-232 Cable

Analog Signal Output, ,

The analog signal output (e.g. detector signal or pump pressure signal) can be distributed to a recording device. For details refer to the description of the main board of the module.

APG Remote, ,

The APG Remote connector may be used in combination with other analytical instruments from Agilent Technologies if you want to use features as common shut down, prepare, and so on.

Remote control allows easy connection between single instruments or systems to ensure coordinated analysis with simple coupling requirements.

The subminiature D connector is used. The module provides one remote connector which is inputs/outputs (wired-or technique).

To provide maximum safety within a distributed analysis system, one line is dedicated to SHUT DOWN the system's critical parts in case any module detects a serious problem. To detect whether all participating modules are switched on or properly powered, one line is defined to summarize the POWER ON state of all connected modules. Control of analysis is maintained by signal readiness READY for next analysis, followed by START of run and optional STOP of run triggered on the respective lines. In addition PREPARE and START REQUEST may be issued. The signal level are defined as:

- standard TTL levels (0 V is logic true, + 5 V is false)
- fan-out is 10,
- input load is 2.2 kOhm against + 5 V, and
- output are open collector type, inputs/outputs (wired-or technique).

NOTE All common TTL circuits operate with a 5 volt power supply. A TTL signal is defined as "low" or L when between 0 V and 0.8 V and "high" or H when between 2.0 V and 5 V (with respect to the ground terminal).

Table 20 Remote Signal Distribution

Pin	Signal	Description
1	DGND	Digital ground
2	PREPARE	(L) Request to prepare for analysis (for example, calibration, detector lamp on). Receiver is any module performing preanalysis activities.
3	START	(L) Request to start run / timetable. Receiver is any module performing run-time controlled activities.

Table 20 Remote Signal Distribution

Pin	Signal	Description
4	SHUT DOWN	(L) System has serious problem (for example, leak: stops pump). Receiver is any module capable to reduce safety risk.
5		Not used
6	POWER ON	(H) All modules connected to system are switched on. Receiver is any module relying on operation of others.
7	READY	(H) System is ready for next analysis. Receiver is any sequence controller.
8	STOP	(L) Request to reach system ready state as soon as possible (for example, stop run, abort or finish and stop injection). Receiver is any module performing run-time controlled activities.
9	START REQUEST	(L) Request to start injection cycle (for example, by start key on any module). Receiver is the autosampler.

Special Interfaces, ,

Some 1100/1200 modules have module specific interfaces/connectors. They are described in the module documentation.

Setting the 8-bit Configuration Switch, , ,

The 8-bit configuration switch is located next to the GPIB connector. Switch settings provide configuration parameters for GPIB address, serial communication protocol and instrument specific initialization procedures.

Factory setting is shown for the variable wavelength detector

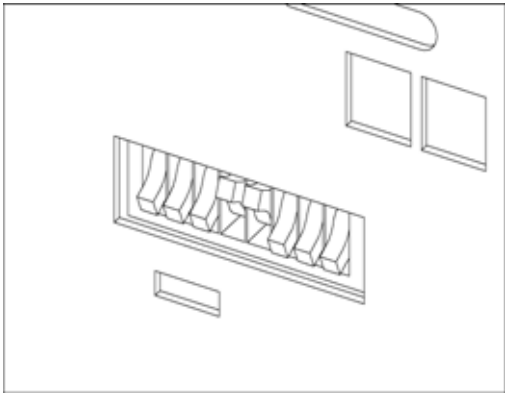


Table 21 8-bit Configuration Switch

Mode Select	1	2	3	4	5	6	7	8
GPIB	0	0		GPIB address				
RS-232C	0	1	Baud rate			Data bits	Parity	
Reserved	1	0	Reserved					
TEST/BOOT	1	1	RSVD	SYS		RSVD	RSVD	FC

Switches 1 and 2 define which set of parameters (for example, for GPIB, RS-232C, and so on) will be changed. Once the change has been completed, the instrument must be powered up again in order to store the values in the non-volatile memory.

In the non-volatile memory, the parameters are kept, regardless of whether you turn the instrument OFF and ON again. They will be kept until the same set of parameters is changed and the power is reset. All other previously stored configuration settings will still remain in the non-volatile memory.

In this way, you can store more than one set of parameters using the same 8-bit configuration switch twice, for example, for both GPIB and RS-232C.

GPIB Default Addresses,

If you just want to change the GPIB address and need a detailed procedure, refer to the *Installing Your Agilent ChemStation System* handbook.

Default GPIB address is set to the following addresses:

Table 22 Default Addresses for Agilent Series 1200 Modules

Module	Address	Binary Address
Pump	22	0 0 0 1 0 1 1 0
FLD	23	0 0 0 1 0 1 1 1
VWD	24	0 0 0 1 1 0 0 0
Agilent 8453A	25	0 0 0 1 1 1 0 1
DAD/MWD	26	0 0 0 1 1 0 1 0
Column compartment	27	0 0 0 1 1 0 1 1
Autosampler	28	0 0 0 1 1 1 0 0
RID	29	0 0 0 1 1 1 0 1

where 0 means that the switch is down and 1 means that the switch is up.

RS-232C Communication Settings,

The communication protocol used in this instrument supports only hardware handshake (CTS/RTS).

Switches 1 in down and 2 in up position define that the RS-232C parameters will be changed. Once the change has been completed, the instrument must be powered up again in order to store the values in the non-volatile memory.

Table 23 Communication Settings for RS-232C Communication

Mode Select	1	2	3	4	5	6	7	8
RS-232C	0	1	Baud rate			Data Bits	Parity	

Use the following tables for selecting the setting which you want to use for RS-232C communication. The number 0 means that the switch is down and 1 means that the switch is up.

Table 24 Baud Rate Settings

Switches			**Baud Rate**	**Switches**			**Baud Rate**
3	**4**	**5**		**3**	**4**	**5**	
0	0	0	9600	1	0	0	9600
0	0	1	1200	1	0	1	14400
0	1	0	2400	1	1	0	19200
0	1	1	4800	1	1	1	38400

Table 25 Data Bit Settings

Switch 6	Data Word Size
0	7 Bit Communication
1	8 Bit Communication

Table 26 Parity Settings

Switches		Parity
7	8	
0	0	No Parity
1	0	Odd Parity
1	1	Even Parity

One start bit and one stop bit are always used (not selectable).

Per default, the module will turn into 19200 baud, 8 data bit with no parity.

Forced Cold Start Settings,

Switches 1 and 2 do not force storage of this set of parameters in non-volatile memory. Returning switches 1 and 2 to other positions (other than being both up) will allow for normal operation.

NOTE Forced cold start erases all methods and data stored in the non-volatile memory. Exceptions are diagnose and repair log books which will not be erased.

If you use the following switch settings and power the instrument up again, a forced cold start has been completed.

Table 27 Forced Cold Start Settings

Mode Select	1	2	3	4	5	6	7	8
TEST/BOOT	1	1	0	0	0	0	0	1

To return to normal operation, set switches back to your GPIB or RS-232C configuration settings.

Stay-Resident Settings,

Firmware update procedures may require this mode in case of firmware loading errors.

Switches 1 and 2 do not force storage of this set of parameters in non-volatile memory. Returning switches 1 and 2 to other positions (other than being both up) will allow for normal operation.

If you use the following switch settings and power the instrument up again, the instrument firmware stays in the resident part, that is, it is not operable as a specific module. It only uses basic functions of the operating system for example, for communication.

Table 28 Stay Resident Settings

Mode Select	1	2	3	4	5	6	7	8
TEST/BOOT	1	1	0	0	1	0	0	0

To return to normal operation, set switches back to your GPIB or RS-232C configuration settings.

The Main Power Supply Assembly

Table 29 Power Supply Specifications (Standard)

Maximum power	160 VA / 130 W	Continuous output
Line Input	100 – 240 volts AC ± 10 %, line frequency of 50/60 Hz	Wide ranging
Pin 1	Power Fail	error message
Pin 2	AGND	
Pin 3	-15 VDC	
Pin 4	+15 VDC	
Pin 5	PGND	
Pin 6	PGND	
Pin 7	+24 VDC	
Pin 8	+24 VDC	
Pin 9	+36 VDC	not used
Pin 10	+36 VDC	not used
Pin 11	DGND	
Pin 12	+ 5 VDC	

5 Using the Autosampler

Sample Trays, 84
List of Recommended Plates and Closing Mat, 85
List of Recommended Vials and Caps 87
Configure Well Plate Types 89
Turn ON and Initialization Steps 92

Sample Trays,

Supported Trays for an Autosampler

Table 30 Trays for an Autosampler

G2258-60011	Tray for 2 well plates or vial plates and 10 x 2 ml vials

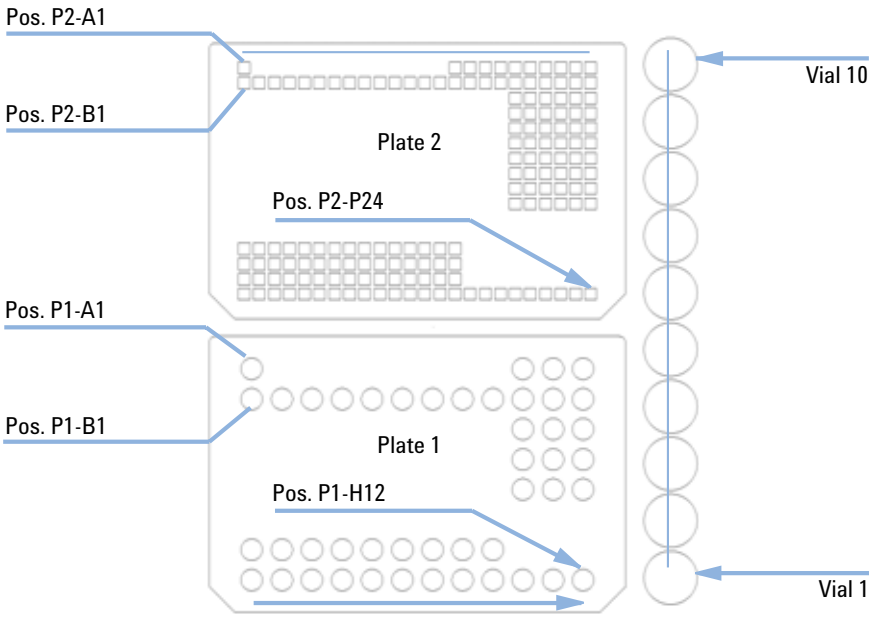


Figure 25 Numbering of vial and well plate position

List of Recommended Plates and Closing Mat,

WARNING

Explosive gas mixtures

There is a risk of building explosive gas mixtures in the instrument if flammable solvents are used.

➔ Cover the plates.

➔ Remove the plates from the sampler after turning it OFF.

WARNING

Contamination with adhesives

Closing mats with adhesive can give some contamination in the system. The adhesive is soluble in most of the solvents used in HPLC.

➔ In general do not use closing mats with adhesive. The sampler has no prepunch needle, therefore the adhesive will clog the needle after several injections.

Table 31 Recommended plates and closing mat

Description	Rows	Columns	Plate height	Volume (µl)	Part Number	Package
384Agilent	16	24	14.4	80	**5042-1388**	30
384Corning	16	24	14.4	80	No Agilent PN	
384Nunc	16	24	14.4	80	No Agilent PN	
96Agilent	8	12	14.3	400	**5042-1386** **5042-1385**	10 120
96Agilent conical	8	12	17.3	150	**5042-8502**	25
96CappedAgilent	8	12	47.1	300	**5065-4402**	1
96Corning	8	12	14.3	300	No Agilent PN	
96CorningV	8	12	14.3	300	No Agilent PN	
96DeepAgilent31mm	8	12	31.5	1000	**5042-6454**	50

Table 31 Recommended plates and closing mat

Description	Rows	Columns	Plate height	Volume (µl)	Part Number	Package
96DeepNunc31mm	8	12	31.5	1000	No Agilent PN	
96DeepRitter41mm	8	12	41.2	800	No Agilent PN	
96Greiner	8	12	14.3	300	No Agilent PN	
96GreinerV	8	12	14.3	250	No Agilent PN	
96Nunc	8	12	14.3	400	No Agilent PN	
Closing mat for all 96 Agilent plates	8	12			**5042-1389**	50

Table 32 Recommended Vial plates

Description	Part Number
• Vial plate for 54 x 2 ml vials (6/pk)	**G2255-68700**
• Vial plate for 15 x 6 ml vials (1/pk)	**5022-6539**
• Vial Plate for 27 Eppendorf tubes	**5022-6538**

List of Recommended Vials and Caps

Table 33 Crimp Top Vials

Description	Volume (ml)	100 / Pack	1000 / Pack	100 / Pack (silanized)
Clear glass	2	**5181-3375**	**5183-4491**	
Clear glass, write-on spot	2	**5182-0543**	**5183-4492**	**5183-4494**
Amber glass, write-on spot	2	**5182-3376**	**5183-4493**	**5183-4495**

Table 34 SnapTop Vials

Description	Volume (ml)	100 / Pack	1000 / Pack	100 / Pack (silanized)
Clear glass	2	**5182-0544**	**5183-4504**	**5183-4507**
Clear glass, write-on spot	2	**5182-0546**	**5183-4505**	**5183-4508**
Amber glass, write-on spot	2	**5182-0545**	**5183-4506**	**5183-4509**

Table 35 Screw Top Vials

Description	Volume (ml)	100 / Pack	1000 / Pack	100 / Pack (silanized)
Clear glass	2	**5182-0714**	**5183-2067**	**5183-2070**
Clear glass, write-on spot	2	**5182-0715**	**5183-2068**	**5183-2071**
Amber glass, write-on spot	2	**5182-0716**	**5183-2069**	**5183-2072**

Table 36 Crimp Caps

Description	Septa	100 / Pack
Silver aluminum	Clear PTFE / red rubber	**5181-1210**
Silver aluminum	Clear PTFE / red rubber	**5183-4498** (1000 / Pack)
Blue aluminum	Clear PTFE / red rubber	**5181-1215**
Green aluminum	Clear PTFE / red rubber	**5181-1216**
Red aluminum	Clear PTFE / red rubber	**5181-1217**

Table 37 Snap Caps

Description	Septa	100 / Pack
Clear polypropylene	Clear PTFE / red rubber	**5182-0550**
Blue polypropylene	Clear PTFE / red rubber	**5182-3458**
Green polypropylene	Clear PTFE / red rubber	**5182-3457**
Red polypropylene	Clear PTFE / red rubber	**5182-3459**

Table 38 Screw Caps

Description	Septa	100 / Pack
Blue polypropylene	Clear PTFE / red rubber	**5182-0717**
Green polypropylene	Clear PTFE / red rubber	**5182-0718**
Red polypropylene	Clear PTFE / red rubber	**5182-0719**
Blue polypropylene	Clear PTFE / silicone	**5182-0720**
Green polypropylene	Clear PTFE / silicone	**5182-0721**
Red polypropylene	Clear PTFE / silicone	**5182-0722**

Configure Well Plate Types

If the plate you are using is not found on the "List of Recommended Plates and Closing Mat," on page 85 you may configure a custom plate. Measure the exact dimensions of the plate as marked below and enter the values in the plate configuration table of the ChemStation.

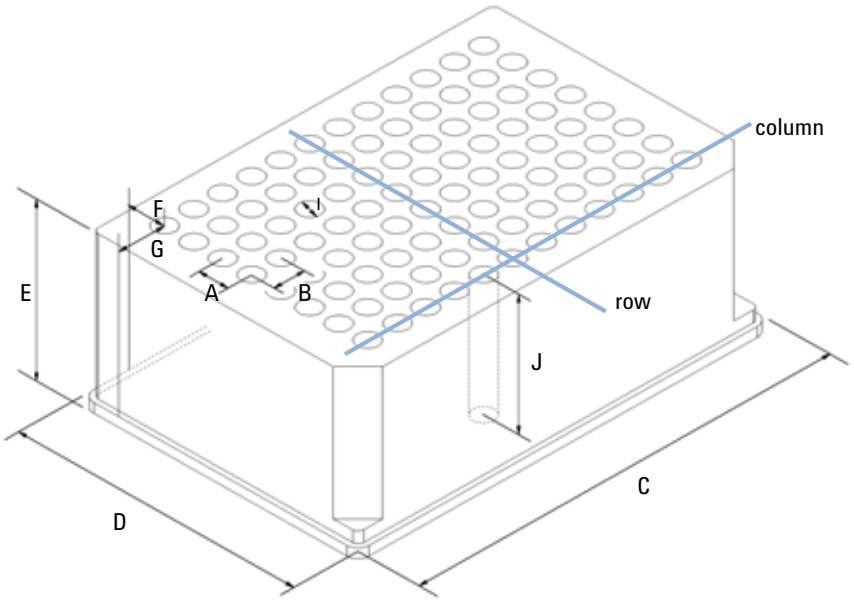


Figure 26 Well Plate Dimensions (straight)

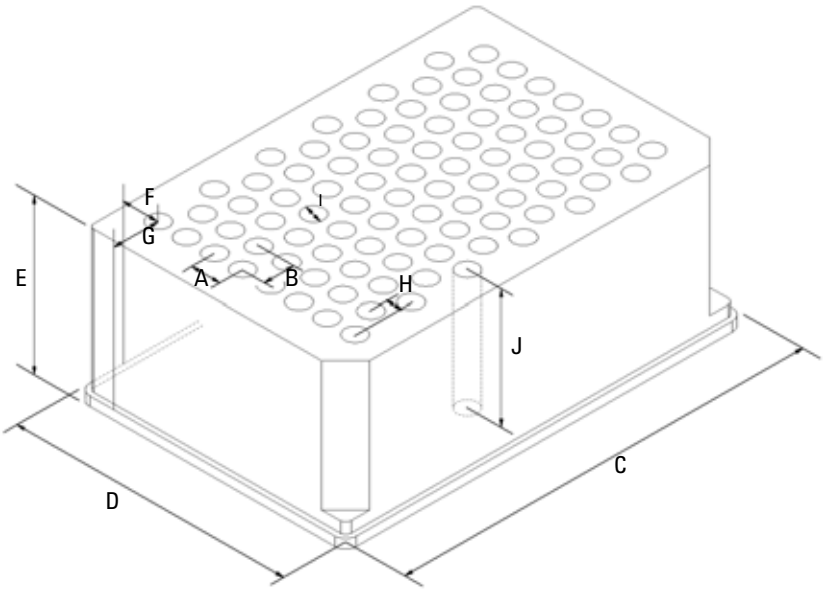


Figure 27 Well Plate Dimensions (staggered)

Table 39 Well Plate Dimensions

Location	Description	Definition	Limits
	Rows	Number of rows on the plate	up to 16
	Columns	Number of columns on the plate	up to 24
	Volume	Volume (in µl) of a sample vessel	
A	Row distance	Distance (in mm) between the center of two rows	
B	Column distance	Distance (in mm) between the center of two columns	
C	Plate length	X size (in mm) at the bottom of the plate	127.75+/- 0.25 mm (SBS Standard)

Table 39 Well Plate Dimensions

Location	Description	Definition	Limits
D	Plate width	Y size (in mm) at the bottom of the plate	85.50+/-0.25 mm (SBS Standard)
E	Plate height	Size (in mm) from the bottom to the top of the plate	up to 47 mm
F	Row offset	Distance (in mm) from the back edge (bottom) to the center of the first hole (A1)	
G	Column offset	Distance (in mm) from the left edge (bottom) to the center of the first hole (A1)	
H	Column shift	Offset (in mm) to Y when the rows are not straight but staggered	
I	Well diameter	Diameter (in mm) of the well	at least 4 mm
J	Well depth	Distance (in mm) from the top of the plate to the bottom of the well	up to 45 mm

NOTE The distances need to be measured with high precision. It is recommended to use calipers.

Turn ON and Initialization Steps

A successful turn-on/initialization takes about 3.5 minutes, and consists of five steps

1. WPS turn on, begins when the main power button is pushed ON. Power indicator turns green. Front cover latch activates immediately.
2. Main fan and exhaust fan turn-on immediately.
3. Main board self-test begins. Status indicator tests red, green and yellow, then goes to yellow. This takes about 20 seconds (from turn-on). The status indicator remains yellow until the initialization process is complete. The user interface indicates “initializing” during this period.
4. The vapor blowout period begins. This lasts for about 2 minutes.
5. WPS sample transport and sampling unit initialization begins at the 2-minutes mark (from turn-on), if the front cover is closed. If the front cover is open at the 2 minutes mark, initialization will start only when the front cover is closed. Initialization takes about 1.5 minutes. When initialization is complete the needle is in the needle seat, the needle lock is down, and the status indicator is off.

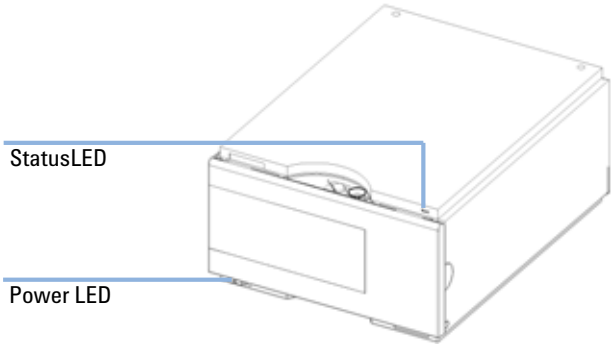


Figure 28 Instrument LED indicator

6 Optimizing Performance

Optimizing Performance 94
Optimization for Lowest Carry-Over 95
- Using the Automated Needle Wash 98
- Using the Flush Port 98
- Cleaning the needle seat 99

Fast Injection Cycle and Low Delay Volume 102
Precise Injection Volume, 104
- Draw and Eject Speed 104

Choice of Rotor Seal 106
Choice of Seat Capillary 107

Optimizing Performance

Autosamplers are more and more used in HPLC to improve the productivity in the laboratories and the consistency and accuracy of analytical results.

The informations below will help you on how to optimize some parameters to achieve best results for:

- lowest carry-over for reliable quantitative data
- Fast injection cycles for high throughput
- Low delay volume for fast gradient
- Precise injection volume

Specific information for optimizing the performance of the Agilent 1200 series high performance autosampler SL+ can be found in the *Agilent 1200 Series Rapid Resolution LC System User Manual.*

Optimization for Lowest Carry-Over

Optimization for Lowest Carry-Over

Carry over (CO) on 1100/1200 Agilent system is not only a topic for injection systems but may have multiple sources:

Hardware related

- sample loop
- needle outside
- needle inside
- needle seat
- seat capillary
- injection valve
- flush time
- wash vials
- fittings
- column (carry-over depends on frit design/material/blockage)
- surface activity of frits
- capillaries

Chemistry/Physics related:

- suitable sample solvent (has to be compatible with mobile phase)
- suitable wash solvent
- suitable mobile phase
- column packing material (e.g. interaction of basic sample with silanols of stationary phase)

The autosampler continuous flow-through design ensures that sample loop, needle inside, seat capillary, and the mainpass of the injection valve is always in the flow line. These parts are continuously flushed during an isocratic and also during a gradient analysis. The residual amount of sample remaining on the outside of the needle after injection may contribute to carry-over in some instances. When using small injection volumes or when injecting samples of

low concentration immediately after samples of high concentration, carry-over may become noticeable. Cleaning the needle in the flush port or using the automated needle wash enables the carry-over to be minimized and prevents also contamination of the needle seat.

Module dependant carry-over performance

All Agilent 1200 series High Performance Autosampler are considering low carry-over. Nevertheless the Agilent 1200 series High Performance Autosampler SL+ is best performing regarding carry-over.

General recommendations for lowest carry-over

Issues in setting up the experiments:

- Use a flush solvent which dissolves the sample well (e.g. aqueous/(organic) acidic for basic samples); set needle wash time to at least 10 sec.
- Use a sample solvent which is compatible with sample and mobile phase. Organic sample solvents (e.g. DMSO) injected into aqueous mobile phase often cause samples to partially deposit on surfaces causing high carry-over. Chlorhexidine, for example, dissolved as a free base in methanol and injected into an acidic aqueous mobile phase shows increased carryover than if it is dissolved in 0.1% TFA. Since it dissolves slowly (but well) in acidic aqueous solvents, it partially deposits on surfaces during the injection cycle.
- Take care at loop capillary change: Push loop capillary forward when tightening the fitting to the needle, ensuring gapless transition from loop to needle. A replaced needle-seat-pair may need 100-200 injections for best carry-over results

Routinely work:

- Prime flush pump for 30 sec. with appropriate solvent previous to the first run after usage outage.
- Ensure that the needle seat is not contaminated. For cleaning the needle seat see chapter “Cleaning the needle seat”.
- Use mainpass operation to avoid discrimination of samples.

- Notice backpressure of a new column; an increase of 10% over time may cause an 10 fold increase in carry-over due to the column.
- Blank vials can be used at least 30 injections.

Specific recommendations if bypass operation is performed

Bypass operation can severely impact carry-over performance due to the fact that during gradient operation the sample path is not flushed with organic mobile phase. This may cause sample discrimination and/or adsorption of especially lipophilic components in loop, needle and seat flow path.

The term bypass operation in this context describes all cases where the Autosampler is switched to the “Bypass Mode” so that the exposure of the Autosampler’s internal flow path parts to the solvent flow coming from the pump may become too short. This may be the case:

- when overlapped Injection with option “when sample is flushed out” is selected
- when the delay volume is minimized by using “Automated Delay Volume Reduction”

This mode is not recommended as there may arise two sources for carry-over. The outlet groove of the injection valve may be contaminated with sample. This is the minor issue and can be resolved by performing steps for cleaning the injection valve (by method or by injector program). The much more problematic issue is that there may remain portions of sample in the sampler. Especially if the sample and sample solvent doesn’t fit to the mobile phase an arbitrarily large amount of sample may miss the column but stay in the main pass. The “Injector Purge Kit” was developed for this purpose. During run the syringe is used as purge pump and afterwards exchanges the purge solvent with (gradient) start conditions. Using this kit decreases the poor bypass carry-over significantly. Eventually main pass performance may be obtained. But the kit does not resolve the problem of discriminating sample compounds.

Contraindication for usage:

- If run times are below 2-3min the purge kit won’t help as the purge step with reasonable purge volume lasts at least 2min.
- In highly carry-over sensitive applications purge kit is not recommended as best performance is got when the Autosampler stays in mainpass the full solvent gradient.

Control software support for the Purge kit is provided and fully operated and controlled through the ChemStation or and G4208A Instant Pilot via the Autosampler Settings (Requires Agilent ChemStation B.01.03 or higher and Firmware A.06.01 and higher on ALL Agilent 1200 Series modules that are part of the system and Firmware B.04.01 for the Control Module).

Using the Automated Needle Wash

The automated needle wash can be programmed either as “injection with needle wash” or the needle wash can be included into the injector program. When the automated needle wash is used, the needle is moved into the wash port after the sample is drawn. By washing the needle after drawing a sample, the sample is removed from the outer surface of the needle immediately. As the flush port is automatically refilled with fresh wash solvent this option should be used routinely. Using wash vials is usually not necessary but available for special applications.

Using a wash vial

If a wash vial is used, it should be considered not to cap the vial. Otherwise small amounts of sample remain on the surface of the septum, which may be carried on the needle to the next sample.

Using the Flush Port

During the injection process when the sample is in the loop and when the valve still is in Bypass, the outside of the needle can be washed in a flush port located behind the injection port on the sampling unit. During the wash cycle as soon the needle is in the flush port a peristaltic pump fills the flush port with fresh solvent during a defined time. The volume of the flush port is about 680 µl and the pump delivers 6 ml/min. Setting the wash time to 10 seconds is sufficient to refill 2 times the flush port. In most cases this is enough to clean the needle outside. Additionally after the needle left the flush port the flush pump keeps running runs for 6 sec. to ensure refill with fresh solvent. At the end of this flush process – if “injection with needle wash” is selected – the needle returns to the injection port, the injection valve is switched to the mainpass position and directs the pump flow back through the sample loop.

For further information on how to reduce carry over see “Optimization for Lowest Carry-Over” on page 95

Recommended Wash Solvents

- water
- ethanol
- methanol
- water/acid (especially for basic compounds)
- water/base (espeecially for acidic compounds)
- water/acetonitrile

NOTE The life time of the tubing in the peristaltic pump is shortened by the usage of organic solvents.

Cleaning the needle seat

If flush port has run out of solvent or the option “needle wash” hasn’t been used for several injections or in case the needle seat has got contaminated, the needle seat may be contaminated and carry-over is significantly higher than expected. For cleaning the needle seat there is an automatic procedure using the mobile phase’s solvents. If that doesn’t work a manual cleaning has to be done. the following procedure can be used to clean the needle seat

Automatic procedure

There’s an injector command for flushing the seat. So a cleaning method can be set up using an injector program.

Injector program

- INJECT
- FLUSH SEAT for 90.0 sec., 0.0 mm offset
- VALVE mainpass

Line 1 starts the run so the pump’s time table is started. Line 2 let’s the needle move above the seat and switches the valve to mainpass so that the pump’s solvent is directed through the loop and the needle onto the seat. The liquid

leaves the seat via the drainage for the flush port. The offset can be used for getting a kind of blast pipe effect. Generally an offset of 0.0mm is a proper value. After the flush time (here 90sec) the valve is switched to bypass. Line 3 moves the needle back into the seat and switches valves back to main pass to restore hydraulic flow as it was before the cleaning process.

The pump's time table can be used if special solvents for cleaning are connected to the pump or if the flushing flow should be adjusted. Here's an illustrating example:

	Time	%B	Flow	Max. Press.
1	0.00	100.0		
2	0.10		0.500	
3	0.11		3.000	
4	0.70	100.0	3.000	
5	0.71	0.0	0.500	

Along with upper injector program this time table uses solvent B for cleaning the seat with an even higher flow rate than the perhaps limiting 0.5ml/min for column flow. To ensure that the flow rate isn't applied to the column and that column doesn't come in contact with flush solvent (in this case solvent B) choose a considerably long time (in this case 90sec) for flushing the seat in the injector program.

Manual procedure

If the automatic procedure doesn't succeed there is the semi-automatic seat back-flushing.

Preparation

- Move the needle to home position.
- Set pump flow to zero
- Connect the seat capillary with the pump capillary using a zero dead volume fitting.

Flushing

- Increase pump flow: The seat is flushed backwards, solvent bubbles over the seat and leaves the seat via the drainage for the flush port

Reconfigure system

- Set pump flow to zero
- Connect the pump outlet capillary to port 1 of injection valve
- Connect the seat capillary to port 5 of the injection valve.
- Reset the injector.

Fast Injection Cycle and Low Delay Volume

Fast Injection Cycle and Low Delay Volume

Short injection cycle times for high sample througput is one of the main issues in analytical laboratories. Shortening cycle time starts with:

- shortening column length
- high flow rate
- steep gradient
- The detector balance may be set to OFF

General recommendations for Fast Injection Cycle Times

As described in this section, the first step to provide short cycle times is optimizing the chromatographic conditions. Then the following Autosampler related issues should be considered:

- Use proper solvent for needle wash to decrease the wash time
- Reduce injection volume
- Increase eject speed
- Increase draw speed (if the viscosity of the sample and the solvent in Autosampler's flow path allows it)
- Do injection preparation in parallel with column equilibration (section "Overlapped Injection after gradient is flushed out")

Having optimized these parameters, further reduction of cycle times can be obtained if column equilibration is short compared to injector preparation or if automated column regeneration is configured. "Overlapped Injection during run mode" decreases this time between runs. But note that carry-over and discrimination may increase dramatically doing so.

Overlapped Injection after gradient is flushed out

In this process the injection can be done in parallel to column equilibration phase without compromising any of the Autosampler's specifications.

This mode has one parameter. The time when to start the overlapped injection defined as "time after begin of run".

Considering a composition gradient that ends after 1 min. with reestablishing starting conditions the overlap time has to be set to somewhat above 1 min. to let the pump fill also the Autosampler's loop with start conditions.

Overlapped Injection during Run

In this process, as soon as the sample has reached the column, the injection valve is switched back to bypass and the next injection cycle is performed except for switching the injection valve to mainpass. This is done after actual run is finished and next analysis is started. Doing so the sample preparation time is saved as parallel to the run.

Switching the valve into the bypass position reduces the system delay volume by the complete Autosampler's flow path volume e.g. 270µl for G1367B. Here the mobile phase is directed to the column without passing sample loop, needle and needle seat capillary. This can help to have faster cycle times especially if low flow rates have to be used like it is mandatory in narrow bore and micro bore HPLC.

NOTE Having the valve in bypass position can increase the carry-over in the system.

The injection cycle times also depend on the injection volume. In identically standard condition, injecting 100 µl instead of 1 µl, increase the injection time by approximately 8 sec. In this case and if the viscosity of the sample allows it, the draw and eject speed of the injection system has to be increased.

Precise Injection Volume,

, , , , , Injection Volumes Less Than 2 µl

When the injection valve switches to the BYPASS position, the mobile phase in the sample loop is depressurized. When the syringe begins drawing sample, the mobile phase is further subjected to decreasing pressure. If the mobile phase is not adequately degassed, small gas bubbles may form in the sample loop during the injection sequence. When using injection volumes < 2 µl, these gas bubbles may affect the injection-volume precision. For best injection-volume precision with injection volumes < 2 µl, use of the Agilent 1200 Series degasser is recommended to ensure the mobile phase is adequately degassed. Also, using the automated needle wash (see "Using the Automated Needle Wash" on page 98) between injections reduces carry-over to a minimum, improving injection-volume precision further.

Draw and Eject Speed

Draw Speed

The speed at which the metering unit draws sample out of the vial may have an influence on the injection volume precision when using viscous samples. If the draw speed is too high, air bubbles may form in the sample plug, affecting precision. The default draw speed is suitable for the majority of applications, however, when using viscous samples, set the draw speed to lower speed for optimum results. A "DRAW" statement in an injector program also uses the draw speed setting which is configured for the autosampler.

Eject Speed

The default draw speed is suitable for the majority of applications. When using large injection volumes, setting the eject speed to a higher value speeds up the injection cycle by shortening the time the metering unit requires to eject solvent at the beginning of the injection cycle (when the plunger returns to the home position).

An “EJECT” statement in an injector program also uses the eject speed setting which is configured for the autosampler. A faster eject speed shortens the time required to run the injector program. When using viscous samples, a high eject speed should be avoided.

Table 40 Draw and eject speed

	Draw speed (µl)	Eject speed (µl)
High performance autosampler		
Default value	200	200
Minimum	10	10
Maximum	1000	1000
High performance autosampler SL+		
Default value	100	100
Minimum	4	4
Maximum	1000	1000
Micro Well Plate Autosampler with 8 µl loop capillary		
Default value	4	10
Minimum	0.7	0.7
Maximum	20	100
Micro Well Plate Autosampler with 40 µl loop capillary		
Default value	4	10
Minimum	0.7	0.7
Maximum	250	250

Choice of Rotor Seal

Vespel™ Seal

The standard seal has sealing material made of Vespel. Vespel is suitable for applications using mobile phases within the pH range of 2.3 to 9.5, which is suitable for the majority of applications. However, for applications using mobile phases with pH below 2.3 or above 9.5, the Vespel seal may degrade faster, leading to reduced seal lifetime.

Tefzel™ Seal

For mobile phases with pH below 2.3 or above 9.5, or for conditions where the lifetime of the Vespel seal is drastically reduced, a seal made of Tefzel is available. Tefzel is more resistant than Vespel to extremes of pH, however, is a slightly *softer* material. Under normal conditions, the expected lifetime of the Tefzel seal is shorter than the Vespel seal, however, Tefzel may have the longer lifetime under more extreme mobile phase conditions.

PEEK Seal

With the High Performance SL+ Autosampler a PEEK rotorseal is used. This warrants a leak tight system at high pressures and allows the usage of solvents ranging from pH 2.3 to 12. The PEEK material may show a reduced lifetime if used with following solvents:

- Methylene chloride
- DMSO
- THF
- High concentrations of sulfuric acid
- High concentrations of nitric acid

Choice of Seat Capillary

Different models of seat capillaries are available for the high performance autosampler, the SL version and the micro well plate autosampler:

For the high performance autosampler

The needle seat assembly includes the needle seat and the seat capillary. The part number for this assembly is: G1367-87101

For the high performance autosampler SL+

The needle seat assembly is made up of two parts:

- Needle seat — **G1367-87105**
- Seat capillary — **G1367-87303** (0.12 mm, 150 mm)
  G1367-87302 (0.17 mm, 150 mm)

The capillary pre-installed in the high performance autosampler SL+ is the G1367-87302.

For the micro well plate sampler

The needle seat assembly is made up of two parts:

- Needle seat — **G1377-87101**
- Seat capillary — **G1375-87317** (100 µm, 150 mm)
  G1375-87316 (75 µm, 150 mm)
  G1375-87300 (50 µm, 150 mm)

part number: G1375-87317 (100 µm) is the capillary preinstalled in the micro well plate autosamplers upon delivery. This capillary is recommended for applications with a 0.3 mm column or higher. It provides less plugging of the capillary in general and especially with biological samples. For small K' this capillary can provide a higher peak width for isocratic analysis.

part number: G1375-87316 (75 µm) is available as a spare part and is recommended for applications with a 0.3 mm column or smaller. This capillary gives full chromatographic performance.

part number: G1375-87300 (50 µm) is available as a spare part and is recommended for applications with a 0.3 mm column or smaller. This capillary gives full chromatographic performance. Due to the small diameter, this capillary can show some blockage.

7 Troubleshooting and Diagnostics

Agilent Lab Monitor & Diagnostic Software 110
Overview of the Sampler's Indicators and Test Functions 111
Status Indicators 113
Power Supply Indicator 113
Instrument Status Indicator 113
Error Messages 115
Maintenance Functions 143
Sample Transport Self Alignment 144
High Performance Autosampler Step Commands , 145
Troubleshooting 146
Troubleshooting the G1367B/D and G1377A Autosampler 148
Errors Which May Occur During the Turn ON and Initialization Process 149
Instrument Logbook Errors and Step by Step Repair Process 156
Needle Centering Over the Vial or the Well 166

Agilent Lab Monitor & Diagnostic Software

The Agilent Lab Monitor & Diagnostic Software (LMD) is an application-independent tool that provides diagnostic capabilities for all Agilent 1200 Series HPLC modules. It includes tests, calibrations, and tools, such as injector steps and maintenance positions. In addition to these features of the LMD 'Basic' edition, the 'Advanced' edition of LMD provides Guided Diagnostics, which interactively supports users of LC instruments to resolve typical issues. Based on chromatographic symptoms, Guided Diagnostics helps users to identify the root cause of their problem, and leads them through the necessary steps to resolve it.

LMD also allows users to monitor the status of their LC instruments. The Early Maintenance Feedback (EMF) feature helps to carry out preventive maintenance. In addition, users can generate a status report for each individual LC instrument.

The tests and diagnostic features as provided by the Agilent Lab Monitor & Diagnostic Software may differ from the descriptions in this manual. For details refer to the LMD help files.

This manual provides lists with the names of Error Messages, Not Ready messages, and other common issues.

Overview of the Sampler's Indicators and Test Functions

Status Indicators

The autosampler is provided with two status indicators which indicate the operational state (prerun, not ready, run, and error states) of the instrument. The status indicators provide a quick visual check of the operation of the autosampler (see "Status Indicators" on page 113).

Error Messages

In the event of an electronic, mechanical or hydraulic failure, the instrument generates an error message in the user interface. For details on error messages and error handling, please refer to the Agilent Lab Monitor & Diagnostic Software.

Maintenance Functions

The maintenance functions position the needle assembly, the needle carrier, the sample transport assembly and the metering device for easy access when doing maintenance (see "Maintenance Functions" on page 143).

Sample Transport Self Alignment

The sample transport self alignment with the sampling unit and the well plate tray is required to compensate for larger deviations in positioning the needle carrier.

The sample transport self alignment is required after disassembling the system or when you exchange the sample transport, the sampling unit, the tray or the MTP main board.

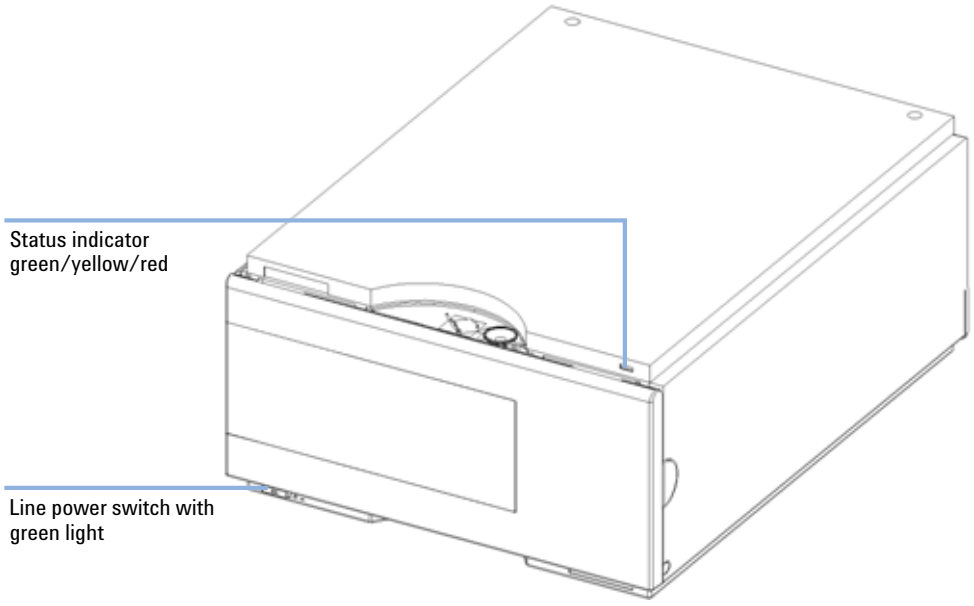
This function is in the diagnose screen of the Chemstation or the Control Module.

Step Commands

The step functions enable execution of each step of the sampling sequence individually. The step functions are used primarily for troubleshooting, and for verification of correct autosampler operation after repair (see "High Performance Autosampler Step Commands ," on page 145). For details on step commands, please refer to the Agilent Lab Monitor & Diagnostic Software.

Status Indicators

Two status indicators are located on the front of the autosampler. The lower left indicates the power supply status, the upper right indicates the autosampler status.



Power Supply Indicator

The power supply indicator is integrated into the main power switch. When the indicator is illuminated (*green*) the power is ON.

Instrument Status Indicator

The instrument status indicator indicates one of four possible instrument conditions:

- When the status indicator is *OFF* (and power switch light is on), the instrument is in a *prerun* condition, and is ready to begin an analysis.
- A *green* status indicator indicates the instrument is performing an analysis (*run* mode).
- A *yellow* status indicator indicates a *not-ready* condition. The instrument is in a not-ready state when it is waiting for a specific condition to be reached or completed (for example, front door not closed), or while a self-test procedure is running.
- An *error* condition is indicated when the status indicator is *red*. An error condition indicates the instrument has detected an internal problem which affects correct operation of the instrument. Usually, an error condition requires attention (for example, leak, defective internal components). An error condition always interrupts the analysis.

Error Messages

Error messages are displayed in the user interface when an electronic, mechanical, or hydraulic (flow path) failure occurs which requires attention before the analysis can be continued (for example, repair, exchange of consumables is necessary). In the event of such a failure, the red status indicator at the front of the module is switched on, and an entry is written into the instrument log book.

This section explains the autosampler error messages, and provides information on probable causes and suggested actions to recover from error conditions.

Timeout ,

The timeout threshold was exceeded.

Probable cause	Suggested actions
1 The analysis was completed successfully, and the timeout function switched off the autosampler as requested.	Check the logbook for the occurrence and source of a not-ready condition. Restart the analysis where required.
2 A not-ready condition was present during a sequence or multiple-injection run for a period longer than the timeout threshold.	Check the logbook for the occurrence and source of a not-ready condition. Restart the analysis where required.

Shut-Down,

An external instrument has generated a shut-down signal on the remote line.

The autosampler continually monitors the remote input connectors for status signals. A LOW signal input on pin 4 of the remote connector generates the error message.

	Probable cause	Suggested actions
1	Leak detected in another module with a CAN connection to the system.	Fix the leak in the external instrument before restarting the autosampler.
2	Leak detected in an external instrument with a remote connection to the system.	Fix the leak in the external instrument before restarting the autosampler.
3	Shut-down in an external instrument with a remote connection to the system.	Check external instruments for a shut-down condition.
4		

Remote Timeout,

A not-ready condition is still present on the remote input.

When an analysis is started, the system expects all not-ready conditions (e.g. a not-ready condition during detector balance) to switch to run conditions within one minute of starting the analysis. If a not-ready condition is still present on the remote line after one minute the error message is generated.

Probable cause	Suggested actions
1 Not-ready condition in one of the instruments connected to the remote line.	Ensure the instrument showing the not-ready condition is installed correctly, and is set up correctly for analysis.
2 Defective remote cable.	Exchange the remote cable.
3 Defective components in the instrument showing the not-ready condition.	Check the instrument for defects (refer to the instrument's reference documentation).

Synchronization Lost

During an analysis, the internal synchronization or communication between one or more of the modules in the system has failed.

The system processors continually monitor the system configuration. If one or more of the modules is no longer recognized as being connected to the system, the error message is generated.

Probable cause	Suggested actions
1 CAN cable disconnected.	• Ensure all the CAN cables are connected correctly. • Ensure all CAN cables are installed correctly.
2 Defective CAN cable.	Exchange the CAN cable.
3 Defective main board in another module.	Switch off the system. Restart the system, and determine which module or modules are not recognized by the system.

, Leak

A leak was detected in the autosampler.

The signals from the two temperature sensors (leak sensor and board-mounted temperature-compensation sensor) are used by the leak algorithm to determine whether a leak is present. When a leak occurs, the leak sensor is cooled by the solvent. This changes the resistance of the leak sensor which is sensed by the leak-sensor circuit on the MTP board.

	Probable cause	Suggested actions
1	Loose fittings.	Ensure all fittings are tight.
2	Broken capillary.	Exchange defective capillaries.
3		
4		
5		
6		
7		
8		
9		

, Leak Sensor Open

The leak sensor in the autosampler has failed (open circuit).

The current through the leak sensor is dependent on temperature. A leak is detected when solvent cools the leak sensor, causing the leak-sensor current to change within defined limits. If the current falls outside the lower limit, the error message is generated.

	Probable cause	Suggested actions
1	Leak sensor not connected to the MTP board.	Ensure the leak sensor is connected correctly.
2	Defective leak sensor.	Exchange the leak sensor.
3		

, Leak Sensor Short

The leak sensor in the autosampler has failed (short circuit).

The current through the leak sensor is dependent on temperature. A leak is detected when solvent cools the leak sensor, causing the leak-sensor current to change within defined limits. If the current increases above the upper limit, the error message is generated.

Probable cause	Suggested actions
1 Defective leak sensor.	Exchange the leak sensor.
2	

, Compensation Sensor Open

The ambient-compensation sensor (NTC) on the MTP board in the autosampler has failed (open circuit).

The resistance across the temperature compensation sensor (NTC) on the MTP board is dependent on ambient temperature. The change in resistance is used by the leak circuit to compensate for ambient temperature changes. If the resistance across the sensor increases above the upper limit, the error message is generated.

Probable cause	Suggested actions
1 Defective MTP board.	Exchange the MTP board.

, Compensation Sensor Short

The ambient-compensation sensor (NTC) on the MTP board in the autosampler has failed (short circuit).

The resistance across the temperature compensation sensor (NTC) on the MTP board is dependent on ambient temperature. The change in resistance is used by the leak circuit to compensate for ambient temperature changes. If the resistance across the sensor falls below the lower limit, the error message is generated.

Probable cause	Suggested actions
1 Defective MTP board.	Exchange the MTP board.

, Fan Failed

The cooling fan in the autosampler has failed.

Probable cause	Suggested actions
1 Fan cable disconnected.	Ensure the fan is connected correctly.
2 Defective fan.	Exchange fan.
3 Defective MTP board.	Exchange the MTP board.
4	

Exhaust Fan Failed

The exhaust fan in the autosampler has failed.

The hall sensor on the fan shaft is used by the MTP board to monitor the fan speed. If the fan speed falls below a certain value the error message is generated and the autosampler shuts down.

Probable cause	Suggested actions
1 Fan cable disconnected.	Ensure the fan is connected correctly.
2 Defective fan.	Exchange fan.
3 Defective MTP board.	Exchange the MTP board.

, Front Door Error

The front door and/or the SLS board are damaged.

Probable cause	Suggested actions
1 The sensor on the SLS board is defective.	Exchange the SLS board.
2 The door is bent or the magnet is misplaced/broken.	• Exchange the door. • Exchange the MTP board.

Side Door Error

The side door and/or the MTP board are damaged.

Probable cause	Suggested actions
1 The door is bent or the magnet is misplaced/broken.	Change the side door.
2 The sensor on the MTP board is defective.	Exchange the MTP board.

, Arm Movement Failed or Arm Movement Timeout

The transport assembly was unable to complete a movement in one of the axes.

The processor defines a certain time window for the successful completion of a movement in any particular axis. The movement and position of the transport assembly is monitored by the encoders on the stepper motors. If the processor does not receive the correct position information from the encoders within the time window, the error message is generated.

See figure for axes identification.

- Arm Movement 0 Failed: X-axis.
- Arm Movement 1 Failed: Z-axis.
- Arm Movement 2 Failed: Theta (needle carrier rotation).

	Probable cause	Suggested actions
1	Mechanical obstruction.	Ensure unobstructed movement of the transport assembly.
2	High friction in transport assembly.	Exchange the sample transport assembly.
3	Defective motor assembly.	Exchange the sample transport assembly.
4	Defective sample transport assembly flex board.	Exchange the sample transport assembly.
5	Defective MTP board.	Exchange the MTP board.

, Valve to Bypass Failed

The injection valve failed to switch to the bypass position.

The switching of the injection valve is monitored by two microswitches on the valve assembly. The switches detect the successful completion of the valve movement. If the valve fails to reach the bypass position, or if the microswitch does not close, the error message is generated.

Probable cause	Suggested actions
1 Valve in an intermediate position between the By-and the Main position.	Turn the WPS main power OFF and ON.
2 Defective injection valve.	Exchange the injection valve.
3 Defective MTP board.	Exchange the MTP board.

, Valve to Mainpass Failed

The injection valve failed to switch to the mainpass position.

The switching of the injection valve is monitored by two microswitches on the valve assembly. The switches detect the successful completion of the valve movement. If the valve fails to reach the mainpass position, or if the microswitch does not close, the error message is generated.

Probable cause	Suggested actions
1 Valve in an intermediate position between the bypass and mainpass positions.	Turn the sampler main power OFF and ON.
2 Defective injection valve.	Exchange the injection valve.
3 Defective MTP board.	Exchange the MTP board.

, Needle Lock Failed

The lock assembly on the sampling unit failed to move successfully.

The upper and lower positions of the needle lock are monitored by position sensors on the sampling unit flex board. The sensors detect the successful completion of the needle lock movement. If the needle lock fails to reach the end point, or if the sensors fail to recognize the needle lock movement, the error message is generated.

Probable cause	Suggested actions
1 Defective or dirty position sensors.	Clean the position sensor.
2 Sticking spindle assembly.	Exchange the sampling unit assembly.
3 Defective needle drive motor	Exchange the needle drive motor.
4 Defective MTP board.	Exchange MTP board.

, Needle to Needle Seat Position

The needle failed to reach the end position in the needle seat.

The position of the needle is monitored by a position encoder on the needle carrier. If the needle fails to reach the end point, or if the encoder fails to recognize the needle carrier movement, the error message is generated.

	Probable cause	Suggested actions
1	Bad sample transport/sampling unit alignment	Do an auto-alignment
2	Bent needle.	Check and exchange the needle assembly if necessary.
3	Missing needle.	Clean or change the needle seat assembly if necessary.
4	Blocked seat.	Exchange the needle carrier assembly.
5	Defective position sensor in the needle carrier assembly.	Exchange the sample transport assembly.
6	Defective MTP board.	Exchange the MTP board.

Needle Carrier Failed

The needle carrier on the Sample Transport Assembly failed to move correctly.

Probable cause	Suggested actions
1 Defective Z-motor.	Exchange the needle carrier assembly.
2 Vial pusher blocked.	Exchange the sample transport assembly.
3 Bad needle carrier positioning in X or Theta.	Exchange the needle carrier assembly.
4 Defective vial pusher sensor.	Exchange the sample transport assembly.
5 Defective MTP main board.	Exchange the MTP main board.

, Missing Vial or Missing Wash Vial

No vial was found in the position defined in the method or sequence.

When the needle carrier moves to a vial and the needle goes into the vial, the position of the needle is monitored by an encoder behind the vial pusher. If no vial is present, the encoder detects an error and the message “missing vial” is generated.

	Probable cause	Suggested actions
1	No vial in the position defined in the method or sequence.	Install the sample vial in the correct position, or edit the method or sequence accordingly.
2	Defective needle carrier assembly.	Exchange the needle carrier assembly.
3	Defective transport assembly flex board.	Exchange the sample transport assembly.
4	Defective MTP board.	Exchange the MTP main board.

, Initialization Failed

The autosampler failed to complete initialization correctly.

The autosampler initialization procedure moves the needle arm and transport assembly to their home positions in a predefined routine. During initialization, the processor monitors the position sensors and motor encoders to check for correct movement. If one or more of the movements is not successful, or is not detected, the error message is generated.

Probable cause	Suggested actions
1 Side door not installed correctly.	• Check if the side door is installed correctly. • Check if the magnet is in place in the side door.
2 Sample transport/sampling unit not aligned correctly.	Do an auto-alignment
3 Mechanical obstruction.	Ensure unobstructed movement of the transport assembly.
4 Defective sampling unit flex board.	Exchange the sample transport assembly.
5 Defective transport assembly flex board.	Exchange the sample transport assembly.
6 Defective sampling unit motor.	Exchange the defective sampling unit motor.
7 Defective MTP board.	Exchange the MTP board.

, Metering Home Failed

The metering plunger has failed to move back to the home position.

The home position sensor on the sampling unit flex board monitors the home position of the plunger. If the plunger fails to move to the home position, or if the sensor fails to recognize the plunger position, the error message is generated.

Probable cause	Suggested actions
1 Dirty or defective sensor.	Exchange the sampling unit flex board.
2 Broken plunger.	Exchange the metering plunger and seal.
3 Defective metering-drive motor.	Exchange the metering-drive motor.
4 Defective MTP board.	Exchange the MTP board.

, Motor Temperature

One of the motors of the transport assembly has drawn excessive current, causing the motor to become too hot. The processor has switched off the motor to prevent damage to the motor.

See figure for motor identification.

- Motor 0 temperature: X-axis motor.
- Motor 2 temperature: Theta (gripper rotation) motor.
- Motor 1 temperature: Z-axis motor.

The processor monitors the current drawn by each motor and the time the motor is drawing current. The current drawn by the motors is dependent on the load on each motor (friction, mass of components etc.). If the current drawn is too high, or the time the motor draws current is too long, the error message is generated.

	Probable cause	Suggested actions
1	Mechanical obstruction.	Ensure unobstructed movement of the transport assembly.
2	High friction in the transport assembly.	Exchange the sample transport assembly.
3	Motor belt tension too high.	Switch off the autosampler at the power switch. Wait at least 10 minutes before switching on again.
4	Defective motor.	Exchange the sample transport assembly.
5	Defective transport assembly flex board.	Exchange the MTP main board.

, Invalid Vial Position

The vial position defined in the method or sequence does not exist.

The reflection sensors on the transport assembly flex board are used to check automatically which sample trays are installed (coding on tray). If the vial position does not exist in the current sample tray configuration, the error message is generated.

Probable cause	Suggested actions
1 Incorrect tray installed.	Install the correct trays, or edit the method or sequence accordingly.
2 Incorrect tray definition.	Install the correct trays, or edit the method or sequence accordingly.
3 Incorrect vial positions defined in the method or sequence.	Install the correct trays, or edit the method or sequence accordingly.
4 Tray recognition defective (dirty sample tray or defective transport assembly flex board).	• Ensure the coding surfaces of the sample tray are clean (located at the rear of the sample tray). • Exchange the transport assembly.

, Peristaltic Pump Error

The peristaltic pump motor in the autosampler has failed.

The current on the motor is used by the MTP board to monitor the speed of the peristaltic pump motor. If the current falls below a certain value, the error message is generated.

Probable cause	Suggested actions
1 Defective motor.	Exchange the peristaltic pump motor.
2 Defective SUD board.	Exchange the SUD board.
3 Defective MTP main board.	Exchange the MTP main board.

, Vessel or Wash Vessel Error

The needle does not reach the target position in the vial or in the vessel of the well plate.

The sensor behind the vial pusher in the needle carrier assembly detects the successful completion of the needle movement to the vessel. If the needle fails to reach the end point, the sensor fails to recognize the needle movement and the error message is generated.

Probable cause	Suggested actions
1 Bad vessel definition in the plate configuration.	Check the vessel definition in the plate configuration.
2 Closing mats to rigid / thick.	Check that the closing mats is not too thick.
3 Bad X or Theta positioning.	Exchange the needle carrier assembly.
4 Defective encoder on the needle carrier assembly.	• Change the sample transport assembly. • Change the MTP main board

, Vessel Stuck to Needle

The vessel sticks to the needle when the needle moves up.

Probable cause	Suggested actions
1 Closing mat to rigid / thick.	Check that the closing mat is not too thick.
2 Bad X or Theta positioning and the needle sticks into the wall between two holes.	Exchange the needle carrier assembly.
3 Defective encoder on the needle carrier assembly.	• Change the sample transport assembly. • Change the MTP main board.

Maintenance Functions

Some maintenance procedures require the needle arm, metering device, and needle carrier to be moved to specific positions to enable easy access to components. The maintenance functions move these assemblies into the appropriate maintenance position. In the ChemStation the sampler maintenance positions can be selected from the Maintenance menu in the Diagnosis display. In the Control Module the functions can be selected in the Test screens of the autosampler. In the Agilent Lab Monitor & Diagnostic Software the maintenance positions can be selected from the "Tools" icon.

Maintenance Functions

The maintenance functions moves the arm assembly in a specific position in order to enables easy access for maintenance operations

Home Position

The “home position” function moves the arm to the right side for better access and exchange of the trays

Park Position

The “park position” function moves the arm to the left side of the tray. In this position it is possible to secure the sample transport mechanism with the protection foam.The sample transport is than ready for transporting.

Change Piston

The “change-piston” function draws the piston away from the home position, relieving the tension on the spring. In this position, the analytical head assembly can be removed and reinstalled easily after maintenance. This position is also used to change the analytical head plunger and metering seal.

Table 41 Maintenance positions

Function	Arm position in X	Arm position in Theta	Arm Position in Z	Note
Change Needle	Left side	Straight	Up	No current on Theta
Change Carrier assembly	Left side	Straight	Middle	No current on the ST
Change Loop capillary	Middle	Left	Up	
Home position	Right side	Left rear	Up	
Park arm	Left side	Right rear	Up	

Sample Transport Self Alignment

The sample transport alignment with the sampling unit and the well plate tray is required to compensate for larger deviations in positioning the needle carrier. This function is in the diagnose screen of the Chemstation or the Control Module. In the Agilent Lab Monitor & Diagnostic Software, this function is in the "Calibration" icon.

The sample transport self alignment is required after disassembling the system or when you exchange:

- The sample transport.
- The sampling unit.
- The MTP main board.
- The autosampler tray base

High Performance Autosampler Step Commands ,

Each movement of the sampling sequence can be done under manual control. This is useful during troubleshooting, where close observation of each of the sampling steps is required to confirm a specific failure mode or verify successful completion of a repair.

Each injector step command actually consists of a series of individual commands that move the autosampler components to predefined positions, enabling the specific step to be done.

Table 42 Step Commands

Step	Action	Comments
Valve Bypass	Switches injection valve to the bypass position.	
Plunger Home	Moves the plunger to the home position.	
Needle Up	Lifts the needle arm to the upper position.	Command also switches the valve to bypass if it is not already in that position.
Move to Location	Move the needle arm to the vial location on the plate	
Needle into sample	Lowers the needle into the vial.	
Draw	Metering device draws the defined injection volume.	Command lifts the needle, and lowers the needle into sample. Command can be done more than once (maximum draw volume of 40/100/5000 µl cannot be exceeded). Use **Plunger Home** to reset the metering device.
Needle Up	Lifts the needle out of the vial.	
Needle into Seat	Lowers the needle arm into the seat.	

Table 42 Step Commands

Step	Action	Comments
Valve Mainpass	Switches the injection valve to the mainpass position.	
Needle Up / Mainpass	Lifts the needle arm to the upper position and Switches the injection valve to the mainpass position.	

Troubleshooting

If the autosampler is unable to perform a specific step due to a hardware failure, an error message is generated. You can use the step commands to perform an injection sequence, and observe how the autosampler responds to each command.

Table 43 on page 146 summarizes the step commands, and lists the error messages and probable causes associated with each possible failure.

Table 43 Step Failures

Step Function	Probable Failure Modes
Valve Bypass	Valve not connected. Defective injection valve.
Plunger Home	Defective or dirty sensor on the sampling-unit flex board. Defective metering-drive motor.
Needle	Defective or dirty sensor on the sampling-unit flex board. Sticking needle-arm assembly. Defective needle-drive motor.
Draw	Sum of all draw volumes exceeds 100 µl (or 40 µl). Defective metering-drive motor.
Needle	Defective or dirty sensor on the sampling-unit flex board. Sticking needle-arm assembly. Defective needle-drive motor.

Table 43 Step Failures

Step Function	Probable Failure Modes
Valve Mainpass	Valve not connected. Defective injection valve.
Needle Up/Mainpass	Blockage in the sample loop or needle (no solvent flow). Defective or dirty sensor on the sampling-unit flex board. Sticking needle-arm assembly. Defective needle-drive motor. Valve not connected. Defective injection valve.

Troubleshooting the G1367B / D and G1377A Autosampler

Gather Information About the Problem

- When did the problem start?
- What was done/changed prior to the start of the problem?

In the Agilent Lab Monitor & Diagnostic Software the "Instrument Status Report" generates a report. This report includes the Instrument configuration with the instrument serial numbers and the firmware revisions, the instrument error history, the EMF editor, the result of the guided diagnostic and the method parameter (optional).

Errors Which May Occur During the Turn ON and Initialization Process

Failure to Turn ON

No activity when power button is pushed on. Power indicator stays off.

Probable cause	Suggested actions
1 Defective main board	• Turn the sampler off. Disconnect the power supply from the main board, see if power indicator becomes green when the sampler is turned-on. • If yes, change the main board (G1367-69520).
2 Power supply defective	• Turn the sampler off. Disconnect the power supply from the main board, see if power indicator becomes green when the sampler is turned-on. • If no, change the power supply (0905-2528 Rev G or higher).

Fan Failure

Early during the turn-on/initialization process a main fan or an exhaust fan error occurs.

Probable cause	Suggested actions
1 Fan not connected to the main board	Make sure the fan is connected to the main board correctly
2 Fan connector defective	Examine the fan connector for irregularities. Correct if possible
3 Fan defective	Replace the defective fan (main fan: 3160-1017, exhaust fan: 3160-4097)
4 Main board defective	Replace the main board (G1367-69520)

Main Board Initialization Fails (I)

Status indicator remains off, but the rest of the turn-on/initialization process is successful.

Probable cause	Suggested actions
1 The heel of the light pipe is not positioned correctly above the LED on the main board	Correctly position the light pipe
2 The main board is defective	Replace the main board (G1367-69520)

Main Board Initialization Fails (II)

Status indicator remains off, and the rest of the turn-on/initialization process fails as well.

Probable cause	Suggested actions
1	Refer to the possible causes and actions for step 5 bellow

Problem With the Vapor Blowout Period

The vapor blowout period does not end approximately 2 minutes after turn-on, initialization does not begin.

Probable cause	Suggested actions
1 The front cover is not closed	Close the front cover. If the “front cover open” message is still displayed:
2 The front cover is closed, but the user interface displays a “front cover open” message	• Make sure the front cover magnet is close enough to the magnet sensor • Check the ribbon cable from the SLS board to the main board • Replace the SLS board (G1367-66505) • replace the main board (G1367-69520)
3 The left side cover is removed	Install the side door. If the “side door open” message is still displayed:
4 The left side cover is installed, but the user interface displays a “side cover open” message	• Make sure the side cover magnet is present in the side door • Make sure the side cover magnet is oriented with the correct pole toward the magnet sensor on the main board and positioned in the side cover such that it is close enough to the magnet sensor • Replace the main board (G1367-69520)

Initialization Fails

The initialization fails to complete its required movements, resulting in one or more of a variety of possible error messages. The error message produced depends on when the failure occurred during the initialization.

Gather the revisions information, user interface error and logbook information, and error code information as described on page 1. Also, consider anything which may have been done just before the initialization failure occurred.

To date, we have seen initialization errors occur for a variety of reasons. As an overall troubleshooting plan, follow the suggested actions described bellow.

If this does not help, take the information from the instrument logbook, refer to the appropriate section in the next chapter and follow the recommended actions step by step.

Probable cause	Suggested actions
1	• Turn the sampler off, manually change the X-position of the sample transport and rotate the needle carrier to a different position, turn-on the sampler again. • If there is any weight on top of the sampler, remove that weight, turn-off the sampler and then turn it on again.

Instrument Logbook Errors and Step by Step Repair Process

The errors in the instrument logbook can be classified in 8 groups. In this section you can find a general step by step troubleshooting process for each of them.

1. Fan Error (Main Fan or Exhaust Fan)

Probable cause	Suggested actions
1	• Make sure the fan is connected to the main board correctly • Examine the fan connector for irregularities. Correct if possible • Replace the defective fan (main fan: 3160-1017, exhaust fan: 3160-4097) • Replace the main board (G1367-69520)

2. Initialization Error

Probable cause	Suggested actions
1	• Upgrade the firmware revision to A.04.14 or higher and the ChemStation revision to A.08.04 or higher • Check the sample transport connectors on the main board/sample transport • Check the connector on the bottom of the sample transport unit • Check for mechanical obstruction on the sample transport (X,Theta, Z) • Change sample transport unit • Change the main board (G1367-69520)

3. Metering Sensor Error

Probable cause	Suggested actions
1	• Check the connectors on the SUD board • Check the sampling unit connector on the main board • Check the connector on the sampling unit • Change the analytical head • Change the sampling unit • Change the main board (G1367-69520)

4. Rheodyne Valve Error

Probable cause	Suggested actions
1	• Turn the system off and on twice • Check the connectors on the SUD board • Check the sampling unit connector on the main board • Check the connector on the sampling unit • Change the rheodyne valve • Change the sampling unit • Change the main board (G1367-69520)

5. Needle Lock Error

Probable cause	Suggested actions
1	• Check the connectors on the SUD board • Check the sampling unit connector on the main board • Check the connector on the sampling unit • Change the sampling unit • Change the main board (G1367-69520)

6. Needle Into Seat Error

Probable cause	Suggested actions
1	• Upgrade the firmware revision to A.04.14 or higher and the ChemStation revision to A.08.04 or higher • Check needle position and correct alignment in the pusher • Perform an auto-alignment

6. Needle Into Seat Error (during initialization of the Sampler)

Probable cause	Suggested actions
1	• Turn-off the system • Perform a forced cold start (move the 8-bit configuration dip switches 1,2,8 at the rear of the instrument to position 1) • Turn-on the system • Perform an auto-alignment • Turn-off the system • Move the 8-bit configuration dip switches 1,2,8 at the rear of the instrument to position 0 • Turn-on the system • Check the connector from needle carrier to the sample transport unit • Check the sample transport connectors on the main board/sample transport • Check the connector on the bottom of the sample transport unit • Change the needle carrier assembly (G1367-60010) • Change the sample transport unit • Change the main board (G1367-69520)

7. Needle / Seat Error

Probable cause	Suggested actions
1	• Upgrade the firmware revision to A.04.14 or higher and the ChemStation revision to A.08.04 or higher • Check if the needle is installed (the sample transport comes without needle) • Check the needle position and correct alignment in the pusher • Check if the seat is not blocked with any parts or material (crystals, glass) • Perform an auto-alignment • Check the connector from the needle carrier to the sample transport unit • Check the sample transport connectors on the main board/sample transport • Check the connector on the bottom of the sample transport • Change the needle and the seat • Change the needle carrier assembly (G1367-60010) • Change the sample transport unit • Change the main board (G1367-69520)

8. Sample Location Error

Probable cause	Suggested actions
1	• Check the plate configuration in the user interface • Ensure the right vials and plates are used • Perform an auto-alignment • Check the connector from the needle carrier to the sample transport unit • Check the sample transport connectors on the main board/sample transport • Check the connector on the bottom of the sample transport unit • Change the needle and the seat • Change the needle carrier assembly (G1367-60010) • Change the sample transport unit • Change the main board (G1367-69520)

Needle Centering Over the Vial or the Well

NOTE The positioning of the needle is very precise. You have to take no action if the needle hits in the safe area.

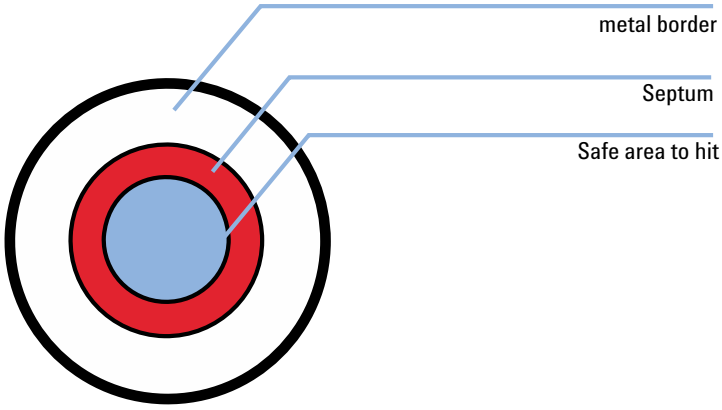


Figure 29 Vial cap

NOTE If the diameter for the safe area is approximately *1mm smaller* than the diameter of the septum no corrective action is necessary.

Action to Take if the Needle Does Not Hit in the Safe Area

- ✔ Check if the right vials or plates are used (see) or (see "List of Recommended Vials and Caps" on page 87).
- ✔ Make sure the needle is correctly installed. It should be pushed into the needle carrier as far forward as possible and centered in the vial pusher.
- ✔ Upgrade the firmware revision to A.04.14 or higher and the ChemStation revision to A.08.04 or higher
- ✔ Perform an auto-alignment (without any plates in place)
- ✔ Change the tray G2258-60011 (see service note G1367-007)

8 Maintenance

Introduction to Maintenance and Repair 168
Simple Repairs - Maintenance 168
Exchanging Internal Parts - Repairs 168
Warnings and Cautions 168
Using the ESD Strap , 169
Cleaning the module 170
Overview of Main Repair Procedures 171
Maintenance Functions 172
Early Maintenance Feedback (EMF) 173
EMF Counters 173
Using the EMF Counters, 174
Setting the EMF Limits, 174
Maintenance Procedures, 175
Removing the Needle Assembly , 176
Installing the Needle Assembly 178
Removing the Needle Carrier Assembly 180
Installing the Needle Carrier Assembly 181
Exchange the Needle Seat Assembly (G1367-87101) on the G1367B Samplers 182
Exchange the Needle Seat (G1367-87105) on the G1367D
Exchange the Needle Seat (G1377-87101) on the G1377A 183
Exchange the Seat Capillary on the G1377A and G1367D 185
Stator Face 186
Rotor Seal , 187
Metering Seal and Plunger , , 188
Removing the Loop Capillary 191
Installing the Loop Capillary 193
Peristaltic Pump 195
Installing Interface Board 196

Introduction to Maintenance and Repair

Simple Repairs - Maintenance

The autosampler is designed for easy repair. The most frequent repairs such as changing a needle assembly can be done from the front of the instrument with the instrument in place in the system stack. These repairs are described in "Maintenance Procedures," on page 175.

Exchanging Internal Parts - Repairs

Some repairs may require exchange of defective internal parts. Exchange of these parts requires removing the autosampler from the stack, removing the covers, and disassembling the autosampler.

Warnings and Cautions

WARNING

Personal injury

Repair work at the autosampler can lead to personal injuries, e.g. shock hazard, when the autosampler cover is opened and the instrument is connected to power.

➔ Remove the power cable from the instrument before opening the autosampler cover.

➔ Do not connect the power cable to the autosampler while the covers are removed.

WARNING

Toxic and hazardous solvents

The handling of solvents and reagents can hold health risks.

➔ When opening capillary or tube fittings solvents may leak out.

➔ Please observe appropriate safety procedures (for example, goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the solvent vendor, especially when toxic or hazardous solvents are used.

CAUTION

Electrostatic discharge at electronic boards and components

Electronic boards and components are sensitive to electrostatic discharge (ESD).

➔ In order to prevent damage always use an ESD protection when handling electronic boards and components.

Using the ESD Strap ,

1 Unwrap the first two folds of the band and wrap the exposed adhesive side firmly around your wrist.

2 Unroll the rest of the band and peel the liner from the copper foil at the opposite end.

3 Attach the copper foil to a convenient and exposed electrical ground.

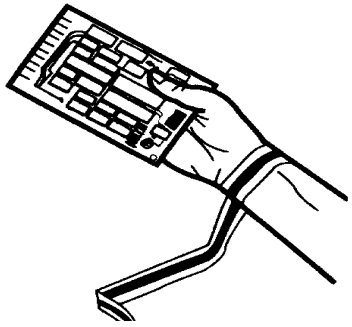


Figure 30 Using the ESD Strap

Cleaning the module

The module case should be kept clean. Cleaning should be done with a soft cloth slightly dampened with water or a solution of water and mild detergent. Do not use an excessively damp cloth as liquid may drip into the module.

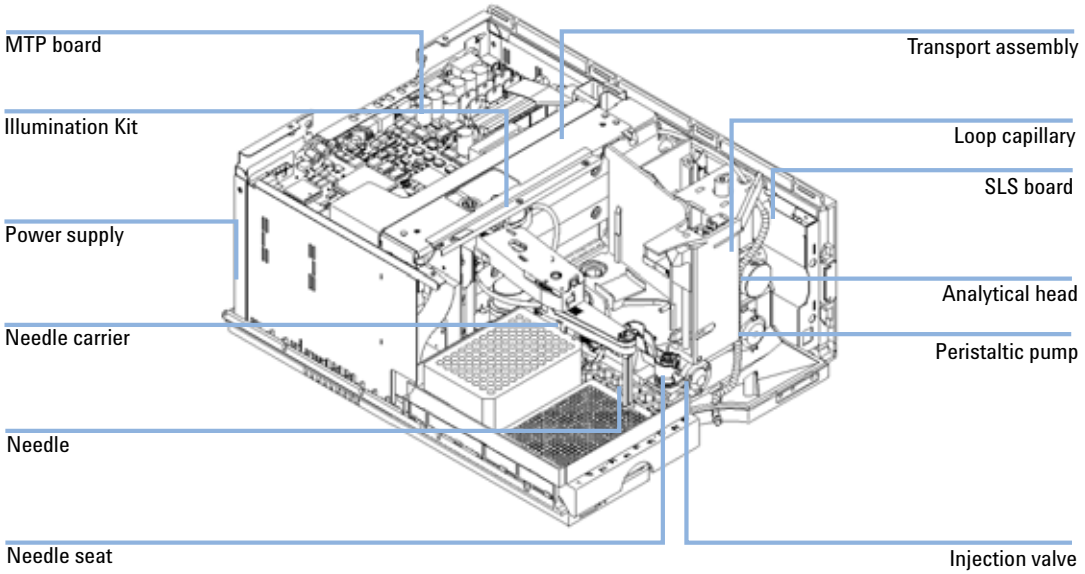
WARNING

Liquid shall not touch the module electronics.

It could cause shock hazard and it could damage the module.

➔ Do not let liquid drip into the module.

Overview of Main Repair Procedures



Maintenance Functions

Some maintenance procedures require the needle arm, metering device, and needle carrier to be moved to specific positions to enable easy access to components. The maintenance functions move these assemblies into the appropriate maintenance position. For details, refer to "Maintenance Functions" on page 143.

Early Maintenance Feedback (EMF)

Maintenance requires the exchange of components in the flow path which are subject to mechanical wear or stress. Ideally, the frequency at which components are exchanged should be based on the intensity of usage of the instrument and the analytical conditions, and not on a predefined time interval. The early maintenance feedback (EMF) feature monitors the usage of specific components in the instrument, and provides feedback when the user-setable limits have been exceeded. The visual feedback in the user interface provides an indication that maintenance procedures should be scheduled.

EMF Counters

The autosampler provides four EMF counters. Each counter increments with autosampler use, and can be assigned a maximum limit which provides visual feedback in the user interface when the limit is exceeded. Each counter can be reset to zero after maintenance has been done. The autosampler provides the following EMF counters:

Injection Valve Counter

This counter counts the number of valve switching EF4512, since the last reset of the counter.

Needle Assembly Counter

This counter counts the total number of needle into seat movements (used for the needle life time) EF4510, since the last reset of the counter.

Seat Assembly Counter

This counter counts the total number of needle into seat movements (used for the seat life time) EF4511, since the last reset of the counter.

Peristaltic Pump

This counter gives the accumulates active pump time in units seconds EF4513.

Using the EMF Counters,

The user-setable EMF limits for the EMF counters enable the early maintenance feedback to be adapted to specific user requirements. The wear of autosampler components is dependent on the analytical conditions, therefore, the definition of the maximum limits need to be determined based on the specific operating conditions of the instrument.

Setting the EMF Limits,

The setting of the EMF limits must be optimized over one or two maintenance cycles. Initially, no EMF limit should be set. When instrument performance indicates maintenance is necessary, make note of the values displayed by the injection valve and needle movements counters. Enter these values (or values slightly less than the displayed values) as EMF limits, and then reset the EMF counters to zero. The next time the EMF counters exceed the new EMF limits, the EMF flag will be displayed, providing a reminder that maintenance needs to be scheduled.

Maintenance Procedures,

The procedures described in this section can be done with the autosampler in place in the stack. These procedures can be done on a more frequent basis.

Table 44 Simple Repair Procedures

Procedure	Typical Frequency	Notes
Exchanging the needle assembly	When the limit in the needle into seat counter in the EMF is exceeded. When needle shows indication of damage or blockage	See "Removing the Needle Assembly ," on page 176
Exchanging the needle carrier assembly	When the needle carrier is defective	See "Removing the Needle Carrier Assembly" on page 180
Exchanging the needle seat assembly	When the limit in the needle into seat counter in the EMF is exceeded. When needle seat shows indication of damage or blockage	See "Exchange the Needle Seat Assembly (G1367-87101) on the G1367B Samplers" on page 182
Exchanging the stator face	When the valve performance shows indication of leakage or wear	See "Stator Face" on page 186
Exchanging the rotor seal	When the limit in the injector valve switches counter in the EMF is exceeded. When the valve performance shows indication of leakage or wear	See "Rotor Seal ," on page 187
Exchanging the metering seal	When autosampler reproducibility indicates seal wear	See "Metering Seal and Plunger , ," on page 188
Exchanging the loop capillary	When loop capillary blocked or broken	See "Removing the Loop Capillary" on page 191
Exchanging the peristaltic pump	When tubing broken	See "Peristaltic Pump" on page 195

Removing the Needle Assembly ,

When

- When the needle is visibly damaged
- When the needle is blocked

Tools required

- Two 1/4 inch-5/16 inch wrenches 8710-0510 (supplied in accessory kit)
- 4 mm open end wrench 8710-1534 (supplied in accessory kit)

Parts required

#	Part number	Description
1	G1367-87202	Needle assembly for G1367B/D
1	G1377-87201	Needle assembly for G1377A

WARNING

Risk of injury by uncovered needle

An uncovered needle is a risk of harm to the operator.

➔ Be careful when you remove the needle assembly.

➔ Use the silicon safety tube supplied with every new needle.

1 In the user interface start the maintenance mode and select the “Change Needle/Seat” function. In the Agilent Lab Monitor & Diagnostic Software the “Change Needle/Seat” function can be found in the “Tools” icon.

2 Open the front door and remove the side door.

3 Remove the plate tray from the tray base.

4 Push the silicon safety tube, supplied in the WPS leak kit (G1367-60006) and with every new needle, over the needle.

5 Unlock the needle tighter lock system.

6 Loosen the loop capillary fitting on the analytical head side.

7 Remove the loop capillary corrugated waste tube.

8 Pinch the holder clamp, pull back and remove the needle assembly with the loop capillary from the needle carrier.

9 Attach the 5/16 inch wrench to hold position at the needle assembly. Use the 4 mm wrench to loosen the fitting of the loop capillary.

NOTE

Do not bend the sheet metal of the needle.

10 Pull the loop capillary out from the needle assembly.

Installing the Needle Assembly

When

- When the needle is visibly damaged
- When the needle is blocked

Tools required

- Two 1/4 inch-5/16 inch wrenches 8710-0510 (supplied in accessory kit)
- 4 mm open end wrench 8710-1534 (supplied in accessory kit)

Parts required

#	Part number	Description
1	G1367-87202	Needle assembly for G1367B/D
1	G1377-87201	Needle assembly for G1377A

WARNING

Risk of injury by uncovered needle

An uncovered needle is a risk of harm to the operator.

➔ Be careful when you remove the needle assembly.

➔ Use the silicon safety tube supplied with every new needle.

1 Push the silicon safety tube, supplied in the WPS leak kit (G1367-60006) and with every new needle, over the needle.

2 Pull the loop capillary in the new needle assembly (G1367-87202 or G1377-87201).

3 Attach the 5/16 inch wrench to hold position at the needle assembly. Use the 4 mm wrench to tighten the fitting of the loop capillary.

NOTE

Do not hold the needle during this step to avoid to bending it.

4 Push the loop capillary into the loop capillary protection tube until it comes out on the sampling unit side.

5 Tighten the loop capillary fitting to the analytical head.

6 Install the loop capillary corrugated waste tube over the loop capillary.

7 Pinch the holder clamp and reinsert the needle assembly into the needle carrier.

8 Lock the needle tighter lock system.

9 Push the black chain into the needle assy until the stop.

10 Check the alignment of the needle in the needle pusher of the needle carrier by viewing from several directions to see that it is aligned in the center of the needle pusher.

NOTE The needle must be centered in the needle pusher as all alignment by the autosampler is calculated from the needle pusher position.

11 Remove the silicon safety tube from the needle.

12 Replace the plate tray in the tray base. Re-install the side door and close the front door.

13 In the user interface close the “Change Needle/Seat” function and exit the maintenance mode. In the Agilent Lab Monitor & Diagnostic Software the "Change Needle/Seat" function can be found in the "Tools" icon.

Removing the Needle Carrier Assembly

When When the needle carrier is defect

Tools required
- 2 mm hex key 8710-2438 (supplied in accessory kit)

Parts required

#	Part number	Description
1	G1367-60010	Needle Carrier assembly

WARNING

Risk of injury by uncovered needle

An uncovered needle is a risk of harm to the operator.

➔ Be carefull when you remove the needle carrier assembly.

➔ Use the silicon safety tube supplied with every new needle.

1 In the user interface start the maintenance mode and select the “Change Needle Carrier” function. In the Agilent Lab Monitor & Diagnostic Software the "Change Needle Carrier" function can be found in the "Tools" icon.

2 Open the front door and remove the side door.

3 Remove the plate tray from the tray base.

4 Push the silicon safety tube, supplied in the WPS leak kit (G1367-60006) and with every new needle, over the needle.

5 Pinch the holder clamp, pull back and remove the needle assembly from the needle carrier.

6 Unplug the flex board on the sample transport.

7 Unscrew the three holding hex screws with the 2 mm hex key.

8 Remove the needle carrier assy.

Installing the Needle Carrier Assembly

When When the needle carrier is defect

Tools required
- 2 mm hex key 8710-2438 (supplied in accessory kit)

Parts required

#	Part number	Description
1	G1367-60010	Needle Carrier assembly

1 Install a new needle carrier (G1367-60010) on place

2 Install the three holding hex screws with the 2 mm hex key.

3 Plug in the flex board on the sample transport.

4 Push the silicon safety tube, supplied in the WPS leak kit (G1367-60006) and with every new needle, over the needle.

5 Pinch the holder clamp and reinsert the needle assembly into the needle carrier.

6 Check the alignment of the needle in the needle pusher of the needle carrier by viewing from several directions to see that it is aligned in the center of the needle pusher.

NOTE The needle must be centered in the needle pusher as all alignment by the autosampler is calculated from the needle pusher position.

7 Remove the silicon safety tube from the needle.

8 Replace the plate tray in the tray base.

9 Re-install the side door and close the front door.

10 In the user interface close the “Change Needle Carrier” function and exit the maintenance mode. The instrument will reset. In the Agilent Lab Monitor & Diagnostic Software the "Change Needle Carrier" function can be found in the "Tools" icon.

Exchange the Needle Seat Assembly (G1367-87101) on the G1367B Samplers

When

- When the seat is visibly damaged
- When the seat capillary is blocked

Tools required

- 1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit)
- 4 mm open end wrench 8710-1534 (supplied in accessory kit)
- Flat screwdriver

Parts required

#	Part number	Description
1	G1367-87101	Needle-Seat assy (0.17 mm ID 2.3 µl) for G1367B

1 In the user interface start the maintenance mode and select the “Change Needle/Seat” function. In the Agilent Lab Monitor & Diagnostic Softwarethe "Change Needle/Seat" function can be found under the "Tools" icon

2 Open the front door and remove the side door.

3 Remove the plate tray from the tray base.

4 Disconnect the seat capillary from the injection valve (port 5) with the 1/4 inch wrench.

5 Use the flat-head screwdriver to remove the needle seat.

6 Insert the new needle seat assembly (G1367-87101). Press it firmly in position.

7 Connect the seat capillary to the injection valve (port 5) with the 1/4 inch wrench.

8 Replace the plate tray in the tray base. Re-install the side door and close the front door.

9 In the user interface close the “Change Needle/Seat” function and exit the maintenance mode. In the Agilent Lab Monitor & Diagnostic Software the "Change Needle/Seat" function can be found under the "Tools" icon.

Exchange the Needle Seat (G1367-87105) on the G1367D Exchange the Needle Seat (G1377-87101) on the G1377A

When

- When the seat is visibly damaged
- When the seat capillary is blocked

Tools required

- 1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit)
- 4 mm open end wrench 8710-1534 (supplied in accessory kit)
- Flat screwdriver

Parts required

#	Part number	Description
1	G1367-87105	Needle-Seat (without capillary) for G1367D
1	G1367-87303	Optional Seat Capillary (150 mm 0.12 mm ID) for G1367-87105 Needle Seat
1	G1367-87302	Optional Seat Capillary (150 mm 0.17 mm ID) for G1367-87105 Needle Seat
1	G1377-87101	Needle-Seat (without capillary) for G1377A
1		Optional G1375-87317 Seat Capillary (150 mm 0.10 mm ID) for G1377-87101 Needle Seat
1	G1375-87316	Optional Seat Capillary (150 mm 0.075 mm ID) for G1377-87101 Needle Seat
1	G1375-87300	Optional Seat Capillary (150 mm 0.05 mm ID) for G1377-87101 Needle Seat

1. In the user interface start the maintenance mode and select the “Change Needle/Seat” function. In the Agilent Lab Monitor & Diagnostic Software the "change needle/seat" function can be found under the "Tools" icon.
2. Open the front door and remove the side door.
3. Remove the plate tray from the tray base.
4. Disconnect the seat capillary from the needle seat with the 4 mm open wrench.
5. Use the flat-head screwdriver to remove the needle seat.
6. Insert the new needle seat. Press it firmly in position.
7. Connect the seat capillary to the needle seat with the 4 mm open wrench.
8. Replace the plate tray in the tray base. Re-install the side door and close the front door.
9. In the user interface close the “Change Needle/Seat” function and exit the maintenance mode. In the Agilent Lab Monitor & Diagnostic Software the "change needle/seat" function can be found under the "Tools" icon.

NOTE The seat capillary can be exchanged alone if the needle seat is not damaged.

Exchange the Seat Capillary on the G1377A and G1367D

When

- When the seat is visibly damaged
- When the seat capillary is blocked

Tools required

- 1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit)
- 4 mm open end wrench 8710-1534 (supplied in accessory kit)
- Flat screwdriver

Parts required

#	Part number	Description
1	G1375-87317	Seat Capillary (150 mm 0.10 mm ID) for G1377-87101 Needle Seat
1	G1375-87316	Seat Capillary (150 mm 0.075 mm ID) for G1377-87101 Needle Seat
1	G1375-87300	Seat Capillary (150 mm 0.05 mm ID) for G1377-87101 Needle Seat
1	G1377-87101	Optional Needle-Seat (without capillary) for G1377A
1	G1367-87303	Seat Capillary (150 mm 0.120 mm ID) for G1367-87104 Needle Seat
1	G1367-87302	Seat Capillary (150 mm 0.170 mm ID) for G13767-87104 Needle Seat
1	G1367-87105	Optional Needle-Seat (without capillary) for G1367D

1 Disconnect the seat capillary from the injection valve (port 5) with the 1/4 - 5/16 inch wrench.

2 Remove the needle seat, see "Exchange the Needle Seat (G1367-87105) on the G1367D Exchange the Needle Seat (G1377-87101) on the G1377A" on page 183.

3 Use the seat capillary mounting tool (provided in the accessory kit) and replace the seat capillary from the seat with the 4 mm wrench.

4 Install the seat assembly in its location and reconnect the capillary to the injection valve (port 5).

5 Follow the procedure in "Exchange the Needle Seat (G1367-87105) on the G1367D Exchange the Needle Seat (G1377-87101) on the G1377A" on page 183 to finish the installation.

NOTE Choose the seat capillary diameter, as function of the column and the application you run on the system. See, "Choice of Seat Capillary" on page 107.

Stator Face

When
- When poor injection-volume reproducibility
- When leaking injection valve

Tools required
- 1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit)
- 9/64 inch 15 cm long, T-handle hex key 8710-2394 (supplied in accessory kit)

Parts required

#	Part number	Description
1	0100-1851	Stator Face

CAUTION

Damage of the stator face

The stator face is held in place by the stator head. When removing the stator head, the stator face can be damaged.

➔ When removing the stator head, ensure the stator face does not fall out of the valve.

NOTE

This procedure is only for the injection valve on the G1367B samplers. The injection valve on the G1367D and the G1377A samplers have no ceramic stator face.

1 Open the front door.

2 Remove all capillaries from the injection-valve ports with the 1/4 inch wrench.

3 Unscrew and remove the three stator screws from the stator head with the 9/64 inch wrench.

4 Remove the stator head and stator face.

5 Place the new stator face (0100-1851) on the stator head. The pins on the stator face must engage in the holes on the stator head.

6 Install this stator head/face assy on the injection valve. Tighten the screws alternately with the 9/64 inch wrench until the stator head is secure.

7 Reconnect all the capillaries to the injection valve ports with the 1/4 inch wrench.

8 Close the front cover.

Rotor Seal ,

When

- When poor injection-volume reproducibility
- When leaking injection valve

Tools required

- 1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit)
- 9/64 inch 15 cm long, T-handle hex key 8710-2394 (supplied in accessory kit)

Parts required

#	Part number	Description
1	0100-1853	Vespel Rotor Seal for 0101-0921 injection valve (G1367B)
1	0100-1849	Tefzel Rotor Seal for 0101-0921 injection valve (G1367B)
1	0100-2231	PEEK Rotor Seal for 0101-0921 injection valve (G1367B)
1	0100-2088	Vespel Rotor Seal for 0101-1050 injection valve (G1377A)
1	0101-1416	PEEK Rotor Seal for 0101-1422 injection valve (G1367D)

CAUTION

Damage of the stator face

The stator face is held in place by the stator head. When removing the stator head, the stator face can be damaged.

➔ When removing the stator head, ensure the stator face does not fall out of the valve.

NOTE

The injection valve 0101-1050 for the G1377A sampler has no stator face. The injection valve 0101-1422 for the G1367D sampler has no stator face.

1 Open the front door.

2 Remove all capillaries from the injection-valve ports with the 1/4 inch wrench.

3 Unscrew and remove the three stator screws from the stator head with the 9/64 inch wrench.

4 Remove the stator head, the stator face and the stator ring.

5 Remove the rotor seal (and isolation seal if required).

6 Install the new rotor seal and isolation seal (if required). The metal spring inside the isolation seal must face toward the valve body. In other words, the metal spring should not be visible when the isolation seal is installed.

7 Reinstall the stator ring.

8 Place the stator face on the stator head. The pins on the stator face must engage in the holes on the stator head.

9 Install this stator head/face assy on the injection valve. Tighten the screws alternately with the 9/64 inch wrench until the stator head is secure.

10 Reconnect all the capillaries to the injection valve ports with the 1/4 inch wrench.

11 Close the front cover.

Metering Seal and Plunger , ,

Removing the Metering Seal

When

- When poor injection-volume reproducibility
- When leaking metering device

Tools required

- 1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit)
- 4 mm open end wrench 8710-1534 (supplied in accessory kit)
- 4 mm, 15 cm long, T-handle hex key 8710-2392 (supplied in accessory kit)
- Small flat head screwdriver.

Parts required

#	Part number	Description
1	5063-6589	Metering Seal (pack of 2) for the G1367-60003 100 µl Analytical Head
1	5063-6586	Metering Plunger *for the G1367-60003 100 µl Analytical Head*
1	5022-2175	Metering Seal (pack of 1) for the G1377-60013 40 µl Analytical Head
1	5064-8293	Metering Plunger for the G1377-60013 40 µl Analytical Head

1 In the user interface start the maintenance mode and select the “Change Piston” function. In the Agilent Lab Monitor & Diagnostic Software the "Change Piston" function can be found under the "Tools" icon.

2 Open the front door

3 Remove the corrugated leak tubing

4 Remove the two capillaries from the analytical head (Use a 1/4 inch wrench if you have a SST capillary or a 4 mm wrench if you have a fused silica capillary).

5 Unscrew alternately the two fixing screws with the 4 mm hex key and remove them.

6 Pull the analytical head away from the sampling unit.

7 Remove the two fixing screws from the base of the analytical head.

8 Remove the head body.

9 Using the piston, carefully remove the metering seal. Clean the chamber and ensure all particular matter is removed.

Installing the Metering Seal

When

- When poor injection-volume reproducibility
- When leaking metering device

Tools required

- 1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit)
- 4 mm open end wrench 8710-1534 (supplied in accessory kit)
- 4 mm, 15 cm long, T-handle hex key 8710-2392 (supplied in accessory kit)
- Small flat head screwdriver.

Parts required

#	Part number	Description
1	5063-6589	Metering Seal (pack of 2) for the G1367-60003 100 µl Analytical Head
1	5063-6586	Metering Plunger *for the G1367-60003 100 µl Analytical Head*
1	5022-2175	Metering Seal (pack of 1) for the G1377-60013 40 µl Analytical Head
1	5064-8293	Metering Plunger for the G1377-60013 40 µl Analytical Head

1 Install the new metering seal. Press it firmly into position.

2 Reassemble the analytical head. Press the plunger assembly into the seal.

3 Put the two fixing screws in place and reinstall the analytical head to the sampling unit.

4 Tighten alternately the two fixing screws with the 4 mm hex key.

5 Connect the two capillaries to the analytical head (Use a 1/4 inch wrench if you have a SST capillary or a 4 mm wrench if you have a fused silica capillary).

6 Reinstall the corrugated leak tubing.

7 Close the front door.

8 In the user interface close the “Change Piston” function and exit the maintenance mode. In the Agilent Lab Monitor & Diagnostic Software the "Change Piston" function can be found under the "Tools" icon.

Removing the Loop Capillary

When
- Capillary blocked
- Capillary broken

Tools required
- Two 1/4 inch-5/16 inch wrenches 8710-0510 (supplied in accessory kit)

Parts required

#	Part number	Description
1	G1367-87300	Loop capillary (injection volume up to 100 µl) for the G1367B
1	G1377-87310	Loop capillary (injection volume up to 40 µl) for the G1367D
1	G1375-87315	Loop capillary (injection volume up to 8 µl) for the G1377A
1	G1377-87300	Loop capillary (injection volume up to 40 µl) for the G1377A

WARNING

Risk of injury by uncovered needle

An uncovered needle is a risk of harm to the operator.

➔ Be careful when you remove the loop capillary.

➔ Use the silicon safety tube for the needle.

NOTE

If the loop capillary is not broken and no solvent has leaked into the loop capillary tube, the solvent draw up steps using the syringe can be skipped (steps 5, 6, 8).

1 In the user interface start the maintenance mode and select the “Change Loop Capillary” function. In the Agilent Lab Monitor & Diagnostic Software the "Change Loop Capillary" function can be found under the "Tools" icon.
2 Open the front door and remove the side door.
3 Remove the plate tray from the tray base.
4 Push the silicon safety tube over the needle
5 Remove the corrugated loop capillary waste tube and introduce the small tubing from the leak kit into the loop capillary protection tube.
6 Draw up the liquid with the syringe.
7 Unlock the needle tighter lock system.
8 Draw up the rest of the solvent from the loop capillary protection tube.
9 Loosen the loop capillary fitting on the analytical head side.

10 Pinch the holder clamp, pull back and remove the needle assembly with the loop capillary from the needle carrier.

11 Attach the 5/16 inch wrench to hold position at the needle assembly. Use the 4 mm wrench to loosen the fitting of the loop capillary.

12 Pull the loop capillary out from the needle assembly.

Installing the Loop Capillary

When

Capillary blocked

Capillary broken

Tools required

- Two 1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit)

Parts required

#	Part number	Description
1	G1367-87300	Loop capillary (injection volume up to 100 µl) for the G1367B
1	G1377-87310	Loop capillary (injection volume up to 40 µl) for the G1367D
1	G1375-87315	Loop capillary (injection volume up to 8 µl) for the G1377A
1	G1377-87300	Loop capillary (injection volume up to 40 µl) for the G1377A

1 Pull the new loop capillary in the needle assembly.

2 Attach the 5/16 inch wrench to hold position at the needle assembly. Use the second wrench to tighten the loop capillary fitting.

3 Push the loop capillary into the loop capillary protection tube until it comes out on the sampling unit side.

4 Re install the loop capillary corrugated waste tube over the loop capillary.

5 Retighten the loop capillary fitting on the analytical head.

6 Pinch the holder clamp and reinsert the needle assembly into the needle carrier.

7 Push the black chain into the needle assembly until the stop.

8 Lock the needle tighter lock system.

9 Check the alignment of the needle in the needle pusher of the needle carrier by viewing from several directions to see that it is aligned in the center of the needle pusher.

NOTE The needle must be centered in the needle pusher as all alignment by the autosampler is calculated from the needle pusher position.

10 Remove the silicon safety tube from the needle.

11 Replace the plate tray in the tray base. Re-install the side door and close the front door.

12 In the user interface close the “Change Loop Capillary" function and exit themaintenance mode. In the Agilent Lab Monitor & Diagnostic Software the "Change Loop Capillary" function can be found under the "Tools" icon.

Peristaltic Pump

When
- Tubing blocked or broken.

Tools required
- sand paper

Parts required

#	Part number	Description
1	5065-4445	Peristaltic pump with Pharmed tubing

NOTE The peristaltic pump is a replaceable unit. The tubing inside the pump is not replaceable.

1 Remove the corrugated leak tubing.

2 Press the two clips on the front of the peristaltic pump.

3 Pull the pump forward off the motor shaft.

4 Disconnect the tubing leading to the wash port and the tubing coming from the solvent bottle.

5 Connect the wash port tubing to the upper tubing of the new pump (use sandpaper to get a good grip on the tubing).

6 Connect the tubing coming from the solvent bottle to the lower tubing of the new pump.

7 Push the pump onto the motor shaft until the clips click into place.

8 Reinstall the corrugated leak tubing.

Installing Interface Board

When
- For all repairs inside the sampler or for installation of the board.

Tools required
- Flat-head screwdriver.

Parts required

#	Description
1	Interface board

CAUTION

Electrostatic discharge at the interface board

The interface board is sensitive to electrostatic discharge.

➔ Always use the ESD strap when handling electronic boards.

1 Switch off the autosampler at the main power switch.

2 Disconnect all cables from the existing interface board. Then loosen the interface board holding screws and slide the board out of its holding rails.

3 Identify the interface board slot cover. Loosen the two holding screws, and remove the cover.

4 Carefully insert the new interface board into the holding rails, and push the board into the slot. Make sure the board plugs into the socket correctly.

5 Reconnect all cables to the new interface board.

6 Switch on the sampler.

7 Configuring optional Interface board, see “Optional Interface Boards, ,” on page 66

9 Repairs

Exchanging Internal Parts, 199
Warnings and Cautions 200
Assembling the Main Cover , 202
Light Protection Kit Installation 203
Top Cover and Foam, 204
- Removing the Top Cover and Foam 205
- Installing the Top Cover and Foam 205

Illumination Assembly 206
Transport Assembly, 208
- Removing the Sample Transport 209
- Installing the Sample Transport 209

Sampling Unit, 211
- Removing the Sampling Unit 212
- Installing the Sampling Unit 213

Analytical Head 214
- Removing the Analytical Head 215
- Installing the Analytical Head 215

Peristaltic Pump Motor 216
- Removing the Peristaltic Pump Motor 217
- Installing the Peristaltic Pump Motor 217

Injection-Valve Assembly , 219
- Removing the Injection Valve Assembly 220
- Installing the Injection Valve Assembly 220

Metering-Drive Motor and Belt , 222
- Removing the Metering Drive Motor and Belt 223
- Installing the Metering Drive Motor and Belt 223

Needle-lock Motor and Belt , 225
- Removing the Needle Lock Motor and Belt 226

Installing the Needle Lock Motor and Belt 226
Main Fan, 227
Removing the Main Fan 228
Installing the Main Fan 228
Exhaust Fan, 229
Removing the Exhaust Fan 230
Installing the Exhaust Fan 230
MTP Main Board, , 232
Removing the MTP Main Board 233
Installing the MTP Main Board 233
Introduction, , , 235
SUD Board, 240
Removing the SUD Board 241
Installing the SUD Board 241
SLS Board, 243
Removing the SLS Board 244
Installing the SLS Board 244
Power Supply, 246
Removing the Power Supply 247
Installing the Power Supply 248
Leak Sensor , 249
Removing the Leak Sensor 250
Installing the Leak Sensor 250

Exchanging Internal Parts,

The procedures in this section describe how to exchange defective internal parts. You must remove the autosampler from the stack in order to open the main cover.

Warnings and Cautions

WARNING

Open main cover

The following procedures require opening the main cover of the autosampler.

➔ Always ensure the autosampler is disconnected from the line power when the main cover is removed.

➔ The security lever at the power input socket prevents the autosampler cover from being taken off when line power is still connected.

WARNING

Instrument is partially energized when switched off

The power supply still uses some power, even if the power switch on the front panel is turned off.

➔ To disconnect the autosampler from line power, unplug the power cord.

WARNING

Toxic and hazardous solvents

The handling of solvents and reagents can hold health risks.

➔ When opening capillary or tube fittings solvents may leak out.

➔ Please observe appropriate safety procedures (for example, goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the solvent vendor, especially when toxic or hazardous solvents are used.

CAUTION

Electrostatic discharge at electronic boards and components

Electronic boards and components are sensitive to electrostatic discharge (ESD).

➔ In order to prevent damage always use an ESD protection when handling electronic boards and components.

NOTE The electronics of the sampler will not allow operation when the top cover and the top foam are removed. A safety light switch on the main board will inhibit the operation of the sampler. Always operate the sampler with the top foam and top covers in place.

Assembling the Main Cover ,

Parts required	#	Part number	Description
	1	5067-1556	Cabinet kit
	1	5042-8901	Name plate

CAUTION

Incorrect assembly of main cover

The main cover cannot be disassembled once assembled incorrectly.

➔ Observe the assembly instructions carefully.

NOTE

The cabinet kit contains all parts, but it is not assembled.

1 Insert the “Agilent Technologies 1200 Series” name plate into the recess in the top cover.
2 Place the top cover on the bench.
3 Press the door hinge in place.
4 Press the side panels into the slots in the top cover.
5 Press the front door into the slots in the top cover.

Light Protection Kit Installation

1 Remove the transparent front door and install the dark one.
2 Slide the transparent window out of the side panel.
3 Slide the dark window in the side panel.

Top Cover and Foam,

CAUTION

Electrostatic discharge at the MIO-interface board

This procedure requires removal of the MIO-interface board. The board is sensitive to electrostatic discharge.

➔ Always use the ESD strap when handling electronic boards.

Removing the Top Cover and Foam

When
- When accessing internal parts.

Tools required
- Pozidrive screwdriver
- Flat-head screwdriver (if interface board installed)

Parts required

#	Part number	Description
1	5041-8395	Foam kit (includes top and bottom foam).

1 Switch off the autosampler at the main power switch. Remove the power cable.

2 If an interface board is installed, remove it (see "Installing Interface Board" on page 196).

3 Move the safety lever to the left. Lift the clips on the top cover. Lift the cover away.

4 Unscrew the three screws on the top plate and remove it.

5 Carefully remove the top foam.

Installing the Top Cover and Foam

1 Install the top foam. Press the foam firmly into place.

2 Engage the slot on the top plate onto the side plate.

3 Fix the top plate in place with the three screws.

4 Engage the top cover into the bottom cover.

5 Lower the cover into place. Ensure the clips close firmly.

6 Slide the safety lever to the right, and install the power cable.

Illumination Assembly

When

- Defective LEDs
- Defective internal parts (before removing the transport assembly)

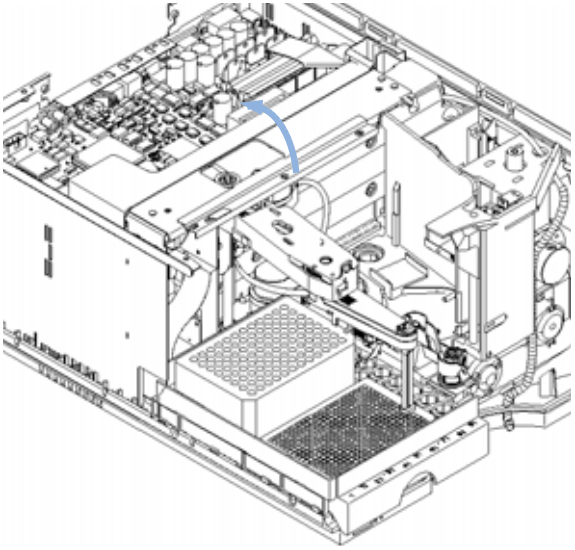
Parts required

#	Part number	Description
1	G1367-60040	Illumination assembly

1 Remove the top cover, top plate, and foam (see "Top Cover and Foam," on page 204).

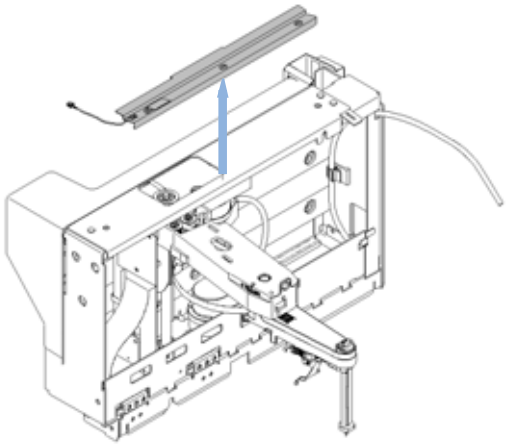
2 Disconnect the cable of the illumination assembly at the autosampler mainboard.

3 The illumination assembly is located at the top rail of transport assembly. After disconnecting the cable from the autosampler mainboard, the illumination assembly can be removed by turning the rail approximately 60 degrees.



4 Then lift the complete assembly.

5 To install a new illumination assembly, position it at the top rail of the transport assembly. There are no screws, the foam will keep the assembly in place.



Transport Assembly,

Removing the Sample Transport

When

- Defective transport assembly/Defective flex board or sensors.

Tools required

- 1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit)
- 4 mm open end wrench 8710-1534 (supplied in accessory kit)
- Pozidrive screwdriver
- Flat-head screwdriver (if interface board installed)

Parts required

#	Part number	Description
1	G1367-60019	Sample Transport assembly for the G1367B/D
1	G1377-60009	Sample Transport assembly for the G1377A

1 In the user interface start the maintenance mode and select the “Change Needle/Seat” function. In the Agilent Lab Monitor & Diagnostic Software the "Change Needle/Seat" function can be found under the "Tools" icon.

2 Switch off the autosampler at the main power switch. Remove the power cable.

3 Remove the top cover, top plate, and foam (see “Top Cover and Foam,” on page 204).

4 Remove the loop capillary corrugated waste tube.

5 Disconnect the loop capillary from the analytical head (Use a 1/4 inch wrench if you remove a SST capillary or a 4 mm wrench if you remove a fused silica capillary).

6 Lift out the transport assembly. This may require a flat head screwdriver to separate the sample transport assembly from the sampling unit.

Installing the Sample Transport

1 Slide the new transport assembly into the autosampler.

2 Ensure the transport assembly is seated firmly.

3 Reconnect the loop capillary to the analytical head (Use a 1/4 inch wrench if you reconnect a SST capillary or a 4 mm wrench if you reconnect a fused silica capillary).

4 Reinstall the loop capillary corrugated waste tube.

5 Install the top cover, top plate, and foam (see “Top Cover and Foam,” on page 204).

6 Turn **ON** the sampler, close the front door.

The system will reset automatically.

7 In the user interface perform a “Sample Transport Self Alignment”. In the Agilent Lab Monitor & Diagnostic Software the "Sample Transport Self Alignment" can be found under the "Calibration" icon.

Sampling Unit,

Removing the Sampling Unit

When

- When sampling unit defective.

Tools required

- 1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit)
- 4 mm open end wrench 8710-1534 (supplied in accessory kit)
- Pozidrive screwdriver
- Flat-head screwdriver (if interface board installed)

Parts required

#	Part number	Description
1	G1367-60008	Sampling unit for the G1367B
1	G1367-60028	Sampling unit for the G1367D
1	G1377-60008	Sampling unit for the G1377A(The assy comes without injection valve and analytical head)

1 In the user interface start the maintenance mode and select the “Change Needle/Seat” function. In the Agilent Lab Monitor & Diagnostic Software the "Change Needle/Seat" function can be found under the "Tools" icon.

2 Switch off the autosampler at the main power switch. Remove the power cable.

3 Remove the top cover, top plate, and foam (see “Top Cover and Foam,” on page 204).

4 Remove the plate tray from the tray base.

5 Remove the transport assembly, (see “Removing the Sample Transport” on page 209).

6 On the injection valve remove the capillaries coming from the pump (port 1) and going to the column compartment (port 6), (Use a 1/4 inch wrench if you remove a SST capillary or a 4 mm wrench if you remove a fused silica capillary).

7 Slide the sampling unit and tray base back to disengage the sampling-unit connector.

8 Lift the sampling unit and tray base approximately 10 cm. Slide the leak sensor out of the leak plane.

9 Lift the sampling unit and tray base out of the autosampler.

10 Turn the tray-base locking screw ¼-turn anti-clockwise.

11 Slide the tray base back to disengage the tray base from the sampling unit.

Installing the Sampling Unit

NOTE The replacement sampling unit is supplied without injection valve and analytical head assembly. If you are exchanging the complete sampling unit, remove the injection valve and the analytical head from the defective sampling unit. Install the valve and analytical head in the new sampling unit. See “Injection-Valve Assembly ,” on page 219 and “Metering-Drive Motor and Belt ,” on page 222.

1 Mount the tray base onto the sampling unit. Ensure the tray base is positioned flush against the sampling unit.

2 Tighten the locking screw 1/4-turn clockwise.

3 While holding the sampling unit and tray base, slide the leak sensor into the holder in the leak plane.

4 Place the sampling unit and tray base into the autosampler.

5 Slide the sampling unit and tray base forwards. Ensure the sampling unit connector is seated correctly.

6 Install the sample transport assembly, (see “Installing the Sample Transport” on page 209).

7 Connect the capillary, coming from the pump on port 1 and the one going to the column compartment on port 6 of the injection valve (Use a 1/4 inch wrench if you reconnect a SST capillary or a 4 mm wrench if you reconnect a fused silica capillary).

8 Install the top cover, top plate, and foam (see “Top Cover and Foam,” on page 204).

9 Replace the plate tray in the tray base.

10 Turn **ON** the sampler, close the front door.

The system will reset automatically.

11 The system will reset automatically.

12 In the user interface perform a “Sample Transport Self Alignment”. In the Agilent Lab Monitor & Diagnostic Software the "Sample Transport Self Alignment" can be found under the "Calibration" icon.

Analytical Head

Removing the Analytical Head

When

- When defective.

Tools required

- 4.0 mm, 15 cm long, T-handle hex key 8710-2392 (supplied in accessory kit)
- 1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit)
- 4 mm open end wrench 8710-1534 (supplied in accessory kit)

Parts required

#	Part number	Description
1	G1367-60003	Analytical Head assembly (100 µl) for G1367B
1	G1377-60023	Analytical Head assembly (40 µl) for G1367D
1	G1367-60013	Analytical Head assembly (40 µl) for G1377A

1 In the user interface start the maintenance mode and select the “Change Piston” function. In the Agilent Lab Monitor & Diagnostic Software the "Change Piston" function can be found under the "Tools" icon.

2 Remove the two capillaries from the analytical head (Use a 1/4 inch wrench if you have a SST capillary or a 4 mm wrench if you have a fused silica capillary).

3 Alternately unscrew the two hex screws which maintain the analytical head with the 4 mm hex key.

4 Remove the analytical head.

Installing the Analytical Head

1 Install the new analytical head on the sampling unit

2 Install and tighten alternately the two hex keys which fix the injection valve assembly.

3 Alternately tighten the two fixing screws with the 4 mm hex key.

4 Connect the two capillaries on the analytical head (Use a 1/4 inch wrench if you have a SST capillary or a 4 mm wrench if you have a fused silica capillary).

5 Close the front door.

6 In the user interface close the “Change Piston” function and exit the maintenance mode. In the Agilent Lab Monitor & Diagnostic Software the "Change Piston" function can be found under the "Tools" icon.

Peristaltic Pump Motor

Removing the Peristaltic Pump Motor

When

- When defective.

Tools required

- 1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit)
- 4 mm open end wrench 8710-1534 (supplied in accessory kit)
- Pozidrive screwdriver
- Flat-head screwdriver (if interface board installed)

Parts required

#	Part number	Description
1	5065-4409	Peristaltic pump motor

1 In the user interface start the maintenance mode and select the “Change Needle/Seat” function. In the Agilent Lab Monitor & Diagnostic Software the "Change Needle/Seat" function can be found under the "Tools" icon.

2 Switch off the autosampler at the main power switch. Remove the power cable.

3 Remove the top cover, top plate, and foam (see “Top Cover and Foam,” on page 204).

4 Remove the plate tray from the tray base.

5 Remove the transport assembly, (see “Removing the Sample Transport” on page 209).

6 Remove the sampling unit, (see “Removing the Sampling Unit” on page 212).

7 Remove the air channel.

8 Remove the peristaltic pump, (see “Peristaltic Pump” on page 195).

9 Remove the base plate of the pump with a small flat-head screwdriver.

10 Disconnect the peristaltic pump motor from the SUD board (labelled “mixing M”).

11 Take out the motor and the holder.

12 Unscrew the 2 screws which hold the peristaltic pump motor.

13 Remove the peristaltic pump motor.

Installing the Peristaltic Pump Motor

1 Install the new motor and tighten the two holding screws.

2 Take in the new motor and holder.

3 Connect the pump motor to the SUD board.

4 Re-assemble the motor holder and the pump base plate.

5 Re-install the air channel.

6 Assemble the peristaltic pump, (see “Peristaltic Pump” on page 195).

7 Install the sampling unit, (see “Installing the Sampling Unit” on page 213)

8 Install the sample transport assembly, (see “Installing the Sample Transport” on page 209).

9 Install the top cover, top plate, and foam (see “Top Cover and Foam,” on page 204).

10 Replace the plate tray in the tray base.

11 Turn **ON** the sampler, close the front door.

The system will reset automatically.

12 In the user interface perform a “Sample Transport Self Alignment”. In the Agilent Lab Monitor & Diagnostic Software the "Sample Transport Self Alignment" can be found under the "Calibration" icon.

Injection-Valve Assembly ,

Removing the Injection Valve Assembly

When

- When defective

Tools required

- 1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit)
- 4 mm open end wrench 8710-1534 (supplied in accessory kit)
- Pozidrive screwdriver

Parts required

#	Part number	Description
1	0101-0921	Injection Valve assembly for the G1367B
1	0101-1422	Injection Valve assembly for the G1367D
1	0101-1050	Micro Injection valve assembly for the G1377A

1 In the user interface start the maintenance mode and select the “Change Needle/Seat” function. In the Agilent Lab Monitor & Diagnostic Software the "Change Needle/Seat" function can be found under the "Tools" icon.

2 Switch off the autosampler at the main power switch. Remove the power cable.

3 Remove the top cover, top plate, and foam (see “Top Cover and Foam,” on page 204).

4 Remove the plate tray from the tray base.

5 Remove the transport assembly, (see “Removing the Sample Transport” on page 209).

6 Remove the sampling unit, (see “Removing the Sampling Unit” on page 212).

7 Disconnect the valve-cable connector from the SUD board (Valve Assy).

8 Remove the three screws which fix the injection valve assembly.

9 Remove the injection valve assembly.

Installing the Injection Valve Assembly

1 Feed the cable of the new valve through to the SUD board.

2 Connect the valve cable to the connector labelled “valve assy”.

3 Install and tighten the three screws which fix the injection valve assembly.

4 Install the sampling unit, (see “Installing the Sampling Unit” on page 213).

5 Install the sample transport (see “Installing the Sample Transport” on page 209).

6 Install the top cover, top plate, and foam (see “Top Cover and Foam,” on page 204).

7 Replace the plate tray in the tray base.

8 Turn **ON** the sampler, close the front door.

The system will reset automatically.

9 The system will reset automatically.

10 In the user interface perform a “Sample Transport Self Alignment”. In the Agilent Lab Monitor & Diagnostic Software the "Sample Transport Self Alignment" can be found under the "Calibration" icon.

Metering-Drive Motor and Belt ,

Removing the Metering Drive Motor and Belt

When

- When belt or motor defective

Tools required

- 1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit)
- 4 mm open end wrench 8710-1534 (supplied in accessory kit)
- Pozidrive screwdriver

Parts required

#	Part number	Description
1	5062-8590	Metering-drive motor
1	1500-0697	Belt

1 In the user interface start the maintenance mode and select the “Change Needle/Seat” function. In the Agilent Lab Monitor & Diagnostic Software the "Change Needle/Seat" function can be found under the "Tools" icon.

2 Switch off the autosampler at the main power switch. Remove the power cable.

3 Remove the top cover, top plate, and foam (see “Top Cover and Foam,” on page 204).

4 Remove the plate tray from the tray base.

5 Remove the transport assembly, (see “Removing the Sample Transport” on page 209).

6 Remove the sampling unit, (see “Removing the Sampling Unit” on page 212).

7 Disconnect the motor connector from the SUD board (labelled “Metering M”).

8 Remove the four screws which fix the motor. Remove the motor.

9 Remove the belt and place it over the shaft.

Installing the Metering Drive Motor and Belt

1 Feed the motor cable through to the SUD board. Connect the cable to (labelled “Metering M”).

2 Install the motor with the four fixing screws.

3 Ensure the belt is seated correctly over the gear and motor shaft.

4 Install the sampling unit, (see “Installing the Sampling Unit” on page 213).

5 Install the sample transport, (see “Installing the Sample Transport” on page 209).

6 Install the top cover, top plate, and foam (see “Top Cover and Foam,” on page 204).

7 Replace the plate tray in the tray base.

8 Turn **ON** the sampler, close the front door.

The system will reset automatically.

9 In the user interface perform a “Sample Transport Self Alignment”. In the Agilent Lab Monitor & Diagnostic Software the "Sample Transport Self Alignment" can be found under the "Calibration" icon.

Needle-lock Motor and Belt ,

Removing the Needle Lock Motor and Belt

When

- When defective

Tools required

- 1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit)
- 4 mm open end wrench 8710-1534 (supplied in accessory kit)
- Pozidrive screwdriver

Parts required

#	Part number	Description
1	5062-8590	Needle-drive motor
1	1500-0697	Belt

1 Switch off the autosampler at the main power switch. Remove the power cable.

2 Remove the top cover, top plate, and foam (see "Top Cover and Foam," on page 204).

3 Disconnect the motor connector from the SUD board (labelled "Metering M").

4 Remove the analytical head assembly, (see "Removing the Analytical Head" on page 215).

5 Remove the belt, the four fixing screws, and remove the motor.

Installing the Needle Lock Motor and Belt

1 Feed the motor cable through to the SUD board. Connect the cable to the connector, labelled "Needle M".

2 Secure the motor in place with the four fixing screws, install the belt.

3 Install the analytical head assembly, (see "Installing the Analytical Head" on page 215).

4 Install the top cover, top plate, and foam (see "Top Cover and Foam," on page 204).

5 Turn **ON** the sampler, close the front door.

The system will reset automatically.

Main Fan,

CAUTION

Electrostatic discharge at the MTP board

The MTP board is sensitive to electrostatic discharge.

➔ Always use the ESD strap (see “Using the ESD Strap ,” on page 169) when handling electronic boards.

Removing the Main Fan

When

- When defective.

Tools required

- 1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit)
- 4 mm open end wrench 8710-1534 (supplied in accessory kit)
- Pozidrive screwdriver

Parts required

#	Part number	Description
1	3160-1017	Fan

1 In the user interface start the maintenance mode and select the “Change Needle/Seat” function. In the Agilent Lab Monitor & Diagnostic Software the "Change Needle/Seat" function can be found under the "Tools" icon.

2 Switch off the autosampler at the main power switch. Remove the power cable.

3 Remove the top cover, top plate, and foam (see “Top Cover and Foam,” on page 204).

4 Remove the plate tray from the tray base.

5 Remove the transport assembly, (see “Removing the Sample Transport” on page 209).

6 Disconnect the fan connector from the MTP main board.

7 Lift the fan, and carefully pull the fan out of the foam.

Installing the Main Fan

1 Install the new fan and connect the fan connector to the MTP main board.

2 Install the sample transport (see “Installing the Sample Transport” on page 209).

3 Install the top cover, top plate, and foam (see “Top Cover and Foam,” on page 204).

4 Replace the plate tray in the tray base.

5 Turn **ON** the sampler, close the front door.

The system will reset automatically.

6 The system will reset automatically.

Exhaust Fan,

Removing the Exhaust Fan

When

- When defective.

Tools required

- 1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit)
- 4 mm open end wrench 8710-1534 (supplied in accessory kit)
- Pozidrive screwdriver

Parts required

#	Part number	Description
1	3160-4097	Fan

1 In the user interface start the maintenance mode and select the “Change Needle/Seat” function. In the Agilent Lab Monitor & Diagnostic Software the "Change Needle/Seat" function can be found under the "Tools" icon.

2 Switch off the autosampler at the main power switch. Remove the power cable.

3 Remove the top cover, top plate, and foam (see “Top Cover and Foam,” on page 204).

4 Remove the plate tray from the tray base.

5 Remove the transport assembly, (see “Removing the Sample Transport” on page 209).

6 Remove the MTP main board, (see “Removing the MTP Main Board” on page 233).

7 Remove the exhaust fan.

Installing the Exhaust Fan

1 Install the exhaust fan.

2 Install the MTP main board, (see “Installing the MTP Main Board” on page 233).

3 Connect the fan connector to the MTP main board.

4 Install the sample transport (see “Installing the Sample Transport” on page 209).

5 Install the top cover, top plate, and foam (see “Top Cover and Foam,” on page 204).

6 Replace the plate tray in the tray base.

7 Turn **ON** the sampler, close the front door.
The system will reset automatically.

MTP Main Board, ,

CAUTION

Electrostatic discharge at the MTP board

The MTP board is sensitive to electrostatic discharge.

➔ Always use the ESD strap (see “Using the ESD Strap ,” on page 169) when handling electronic boards.

Removing the MTP Main Board

When
- When defective

Tools required
- 1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit)
- 4 mm open end wrench 8710-1534 (supplied in accessory kit)
- Pozidrive screwdriver

Parts required

#	Part number	Description
1	G1367-66520	MTP main board
1	G1367-69520	Exchange MTP main board

NOTE This procedure requires reloading the autosampler firmware and reprogramming the instrument serial number.

1. In the user interface start the maintenance mode and select the “Change Needle/Seat” function. In the Agilent Lab Monitor & Diagnostic Software the "Change Needle/Seat" function can be found under the "Tools" icon.
2. Switch off the autosampler at the main power switch. Remove the power cable.
3. Remove the top cover, top plate, and foam (see “Top Cover and Foam,” on page 204).
4. Remove the plate tray from the tray base.
5. Remove the transport assembly, (see “Removing the Sample Transport” on page 209).
6. Remove the connector screws at the back of the module.
7. Remove the M4 screw at the back of the module.
8. Disconnect all connectors on the MTP board
9. Slide the MTP main board out of the sampler.

Installing the MTP Main Board

1. Install the new board. Ensure the ribbon cables are positioned in the slot in the board.

2 Reconnect the connectors to the board.

3 Replace the connector screws in the back of the module.

4 Replace the M4 screw at the back of the module.

5 Install the sample transport, (see “Installing the Sample Transport” on page 209).

6 Install the top cover, top plate, and foam (see “Top Cover and Foam,” on page 204).

7 Replace the plate tray in the tray base.

8 Turn **ON** the sampler, close the front door, the system will reset automatically.

NOTE If a new sampler main board is installed, update the serial number information of the sampler in the user interface, see procedure below.

9 Check the firmware revision of the sampler. If the firmware revision is older than the current firmware revision of the autosampler, update the firmware.

10 Perform a “Sample Transport Self Alignment”. In the Agilent Lab Monitor & Diagnostic Software the "Sample Transport Self Alignment" can be found under the "Calibration" icon.

Introduction, , ,

Introduction, , ,

When the main board has to be replaced, the new board does not have a serial number. For some modules (e.g. pumps or auto samplers) the type has to be changed (multiple usage boards). Use the information from the serial number plate of your module.

Keep in mind that

- the changes become active after a power cycle of the module.
- the information from the serial number plate of the module is used.
- the exact type (product number) is used.

NOTE If the type (product number) was entered incorrectly, the module may become unusable. Proceed to .

NOTE With firmware A.06.02 / B.01.02 and above a wrong type cannot be entered. The entry is checked against the board revision.

Using the LMD Software, ,

Use LMD Software version A.02.02 or later.

The LMD Software must be configured in Service Mode to have access to the function **Board Check and Change**.

Close other user interfaces.

1. Start the LMD software.
2. Select Tools on the left navigation panel.
3. Select in the Tools Selection box **Board Check and Change** and press the button **Start**.
4. Change the field Type and/or Serial as required.

NOTE Some Agilent 1100/1200 series modules require the correct main board version to match the type, for example the SL modules.

5 Press the button **Apply** to complete the action.

A message "The type was changed to XXXXXX. Close this application and switch off and on the changed LC module.

6 Close the LMD Software.

7 Power cycle the module.

8 Restart the User Interface.

Using the Agilent ChemStation, ,

Module serial numbers are entered by typing specific commands on the command line at the bottom of the main user interface screen.

Turn the module on.

Start the Agilent ChemStation.

1 To enter a module serial number, type the following command into the command line:
`print sendmodule$(Lxxx, "ser 'YYNNNNNNNN'")`
or
`print sendmodule$(Nxxx, "ser 'YYNNNNNNNN'")`
where: xxx is the module type, YY is country code (in capital letters) and NNNNNNNN the 8-character serial number of the module in question.

Table 45 ChemStation Command Format - Serial Number Change

Modules with or without optional interface board	Modules with LAN on-board
PRINT SENDMODULE$(Lxxx,"SER 'YYNNNNNNNN'")	PRINT SENDMODULE$(Nxxx,"SER 'YYNNNNNNNN'")
module identifier = L serial number embedded in single-quotes	module identifier = N serial number embedded in single-quotes
PMP, ALS, THM, TCC, VWD, DAD, MWD, FLD, RID	DAD, MWD, VWD

NOTE The first two characters are letters, which should be capitalized.

The reply line will respond with **RA 0000 SER** followed by the module serial number you just entered.

2 To change the type of the module use the following command:
`print sendmodule$(lLxxx, "TYPE 'XXXXX'")`
or
`print sendmodule$(Nxxx, "TYPE 'XXXXX'")`
where: xxx is the module type and XXXXX is the 5-character product number of the module (e.g. G1314B).

Table 46 ChemStation Command Format - Type Change

Modules with or without optional interface board	Modules with LAN on-board
PRINT SENDMODULE$(Lxxx,"TYPE 'XXXXX'")	PRINT SENDMODULE$(Nxxx,"TYPE 'XXXXX'")
module identifier = L product number XXXXX embedded in single-quotes	module identifier = N product number XXXXX embedded in single-quotes
PMP, ALS, THM, TCC, VWD, DAD, MWD, FLD, RID	DAD, MWD, VWD

NOTE Some Agilent 1100/1200 series modules require the correct main board version to match the type, for example the SL modules.

3 Power cycle the module. Then, restart the Agilent ChemStation. If the serial number you have just entered is different than the original module serial number, you will be given the opportunity to edit the configure **1200 access** screen during the restart of the Agilent ChemStation.

4 After restart, the serial number/type you have just entered can be seen under the **Instrument** menu of the main user interface screen.

Using the Instant Pilot G4208A, ,

1 Connect the Instant Pilot to the module. Turn ON the module.

2 On the Instant Pilot's Welcome screen, press **More**, then select **Maintenance**. Using the **up/down arrows**, select the module where you have to change the product number or serial number.

3 Press **PN/SN**. This will display a screen where you can enter the product number and/or serial number.

4 Make your changes, using the information from the product label of your module.

NOTE Some Agilent 1100/1200 series modules require the correct main board version to match the type, for example the SL modules.

5 Press **OK** to highlight the complete command.

6 Press **Done** to transfer the information into the main board's memory. Press **Cancel** quit the process.

7 Power cycle the module. The Maintenance screen should display the correct serial number for this module.

8 If an other User Interface is also connected, restart the User Interface as well.

Using the Control Module G1323B, ,

1 Connect the control module to the module. Turn ON the module.

2 On the control module, press **System** (**F5**), then **Records** (**F4**). Using the **up/down arrows**, make sure that the module is highlighted.

3 Press **FW Update** (**F5**), then **m.** This will display a box which says **Update Enter Serial#**.

4 Press **Enter**. This will display the box labeled **Serial#**.

5 Letters and numbers are created using the up and down arrows. Into the box labeled Serial#, enter the 10-character serial number for the module. When the 10-character serial number is entered, press **Enter** to highlight the complete serial number. Then, press **Done** (**F6**).

6 Turn the module OFF then ON again. The Records screen should display the correct serial number for this module.

7 If a Agilent ChemStation is also connected, restart the Agilent ChemStation now as well.

NOTE To change the product number go to the *System* screen.

8 Press **Tests** (F3) and select the module and press **Enter**.

9 While in the Tests screen, press **m.m** (m dot m).

10 From the box now displayed, select the *Command*, and press **Enter**.

11 Into the box labeled *Nester* (instruction), enter the command **TYPE 'XXXXXX'** where XXXXXX is embedded in single-quotes.

Letters and numbers are created using the up and down arrows. XXXXX is the 5-character product number of the module being changed. There must be a space between the word TYPE and the product number.

NOTE Some Agilent 1100/1200 series modules require the correct main board version to match the type, for example the SL modules.

12 Now, press the **Execute** key. Below the box, a reply line should then say:

Reply RA 0000 TYPE "XXXXX" (XXXXX is what you just entered)

13 Power cycle the module. Turn on should be normal. In the *Records* screen, the product# column should indicate the module you just entered. If an other User Interface is also connected, start it now.

Recover Instructions,

1 Turn off the module.

NOTE Depending on the module type (modules with or without on-board LAN, the 8-bit Configuration Switch works differently. Refer in this case to the module specific manual.

2 Change the 8-bit Configuration Switch to Resident , see “Setting the 8-bit Configuration Switch, , ,” on page 77.

3 Turn the module on.

4 Re-do the type change using your User Interface and correct the type information. Enter the product number without “-R”.

5 Turn the module off.

6 Change the 8-bit Configuration Switch back to default settings, see “Setting the 8-bit Configuration Switch, , ,” on page 77.

7 Turn the module ON again. The User Interface should display the correct type for this module.

SUD Board,

CAUTION

Damage of the flex board

When removing the SUD board, the flex board can be damaged.

➔ Remove the SUD board carefully.

Removing the SUD Board

When

- When defective.

Tools required

- 1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit)
- 4 mm open end wrench 8710-1534 (supplied in accessory kit)
- Pozidrive screwdriver

Parts required

#	Part number	Description
1	G1313-66503	SUD board

1 In the user interface start the maintenance mode and select the “Change Needle/Seat” function. In the Agilent Lab Monitor & Diagnostic Software the "Change Needle/Seat" function can be found under the "Tools" icon.

2 Switch off the autosampler at the main power switch. Remove the power cable.

3 Remove the top cover, top plate, and foam (see “Top Cover and Foam,” on page 204).

4 Remove the plate tray from the tray base.

5 Remove the transport assembly, (see“Removing the Sample Transport” on page 209).

6 Remove the sampling unit, (see “Removing the Sampling Unit” on page 212).

7 Disconnect all connectors from the SUD board.

8 Remove the two fixing screws from the SUD board, and lift out the board.

Installing the SUD Board

1 Install the new board. Ensure the board is positioned between the board guide.

2 Secure the board in place with the two screws.

3 Reconnect all the connectors to the new board.

4 Install the sampling unit, (see “Installing the Sampling Unit” on page 213).

5 Install the sample transport, (see “Installing the Sample Transport” on page 209).

6 Install the top cover, top plate, and foam (see “Top Cover and Foam,” on page 204).

7 Replace the plate tray in the tray base.

8 Turn **ON** the sampler, close the front door.

The system will reset automatically.

9 In the user interface perform a “Sample Transport Self Alignment”. In the Agilent Lab Monitor & Diagnostic Software the "Sample Transport Self Alignment" can be found under the "Calibration" icon.

SLS Board,

Removing the SLS Board

When

- When defective.

Tools required

- 1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit)
- 4 mm open end wrench 8710-1534 (supplied in accessory kit)
- Pozidrive screwdriver

Parts required

#	Part number	Description
1	G1367-66505	SLS board

1 In the user interface start the maintenance mode and select the “Change Needle/Seat” function. In the Agilent Lab Monitor & Diagnostic Software the "Change Needle/Seat" function can be found under the "Tools" icon.

2 Switch off the autosampler at the main power switch. Remove the power cable.

3 Remove the top cover, top plate, and foam (see “Top Cover and Foam,” on page 204).

4 Remove the plate tray from the tray base.

5 Remove the transport assembly, (see “Removing the Sample Transport” on page 209).

6 Remove the sampling unit, (see “Removing the Sampling Unit” on page 212).

7 Remove the SLS board cover.

8 Disconnect the ribbon cable from the SLS-board and unscrew the 2 holding screws.

9 Remove the SLS board from the inside of the module.

Installing the SLS Board

1 Install the new SLS board and the SLS board cover.

2 Install the sampling unit, (see ???).

3 Install the sample transport, (see ???).

4 Install the top cover, top plate, and foam (see ???).

5 Replace the plate tray in the tray base.

6 Turn **ON** the sampler, close the front door.

The system will reset automatically.

7 In the user interface perform a “Sample Transport Self Alignment”. In the Agilent Lab Monitor & Diagnostic Software the "Sample Transport Self Alignment" can be found under the "Calibration" icon.

Power Supply,

CAUTION

Electrostatic discharge at the MTP board

The MTP board is sensitive to electrostatic discharge.

➔ Always use the ESD strap (see “Using the ESD Strap ,” on page 169) when handling electronic boards.

Removing the Power Supply

When

- When defective

Tools required

- 1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit)
- 4 mm open end wrench 8710-1534 (supplied in accessory kit)
- Pozidrive screwdriver

Parts required

#	Part number	Description
1	0950-2528	(rev. G and higher only) Power supply

1 In the user interface start the maintenance mode and select the “Change Needle/Seat” function. In the Agilent Lab Monitor & Diagnostic Software the "Change Needle/Seat" function can be found under the "Tools" icon.

2 Switch off the autosampler at the main power switch. Remove the power cable.

3 Remove the top cover, top plate, and foam (see “Top Cover and Foam,” on page 204).

4 Remove the plate tray from the tray base.

5 Remove the transport assembly, (see “Removing the Sample Transport” on page 209).

6 Remove the sampling unit, (see “Removing the Sampling Unit” on page 212).

7 Remove the MTP main board, (see “Removing the MTP Main Board” on page 233).

8 Remove the fan, (see “Removing the Main Fan” on page 228).

9 Remove the bottom foam.

10 Remove the exhaust fan, (see “Removing the Exhaust Fan” on page 230).

11 Remove the power switch light pipe from the coupler.

12 Remove the two screws which hold the power supply from the rear panel.

13 Lift the power supply out of the module.

14 Remove the coupler from the switch of the power supply.

Installing the Power Supply

1 Insert the coupler onto the switch of the new power supply.
2 Install the power supply in the module.
3 Connect the light pipe to the coupler.
4 Install the bottom foam. Ensure the cables are positioned properly.
5 Install the exhaust fan, (see “Installing the Exhaust Fan” on page 230).
6 Install the MTP board, (see “Installing the MTP Main Board” on page 233).
7 Install the main fan, (see “Installing the Main Fan” on page 228).
8 Install the sampling unit, (see “Installing the Sampling Unit” on page 213).
9 Install the sample transport, (see “Installing the Sample Transport” on page 209).
10 Install the top cover, top plate, and foam (see “Top Cover and Foam,” on page 204).
11 Replace the plate tray in the tray base.
12 Turn **ON** the sampler, close the front door.

   The system will reset automatically.
13 The system will reset automatically.
14 In the user interface perform a “Sample Transport Self Alignment”. In the Agilent Lab Monitor & Diagnostic Software the "Sample Transport Self Alignment" can be found under the "Calibration" icon.

Leak Sensor ,

Removing the Leak Sensor

When
- When defective

Tools required
- 1/4 inch-5/16 inch wrench 8710-0510 (supplied in accessory kit)
- 4 mm open end wrench 8710-1534 (supplied in accessory kit)
- Pozidrive screwdriver

Parts required

#	Part number	Description
1	5061-3356	Leak sensor

1 In the user interface start the maintenance mode and select the “Change Needle/Seat” function. In the Agilent Lab Monitor & Diagnostic Software the "Change Needle/Seat" function can be found under the "Tools" icon.

2 Switch off the autosampler at the main power switch. Remove the power cable.

3 Remove the top cover, top plate, and foam (see “Top Cover and Foam,” on page 204).

4 Remove the plate tray from the tray base.

5 Remove the transport assembly, (see “Removing the Sample Transport” on page 209).

6 Remove the sampling unit, (see “Removing the Sampling Unit” on page 212).

7 Disconnect the leak sensor from the SUD board (labelled “leak sensor”).

8 Remove the sensor.

Installing the Leak Sensor

1 Feed the cable of the new sensor through the base of the sampling unit to the SUD board.

2 Connect the connector to the connector (labelled “leak sensor”).

3 Install the sampling unit, (see “Installing the Sampling Unit” on page 213).

4 Install the sample transport, (see “Installing the Sample Transport” on page 209).

5 Install the top cover, top plate, and foam (see “Top Cover and Foam,” on page 204).

6 Replace the plate tray in the tray base.

7 Turn **ON** the sampler, close the front door.

The system will reset automatically.

8 In the user interface perform a “Sample Transport Self Alignment”. In the Agilent Lab Monitor & Diagnostic Software the "Sample Transport Self Alignment" can be found under the "Calibration" icon.

10 Parts and Materials for Maintenance

Sampler Main Assemblies 254

Vial Trays, 257

High Performance Autosampler and SL+ Version Accessory Kit G1367-68705, , 259

Micro Well Plate Autosampler Accessory Kit G1377-68705, , 260

Multi-Draw Kit G1313-68711 (Only For G1367B), , , , 261

G1373A Injector Purge Kit Parts, 262

Thermostat for ALS/FC/Spotter 264

Sampler Main Assemblies

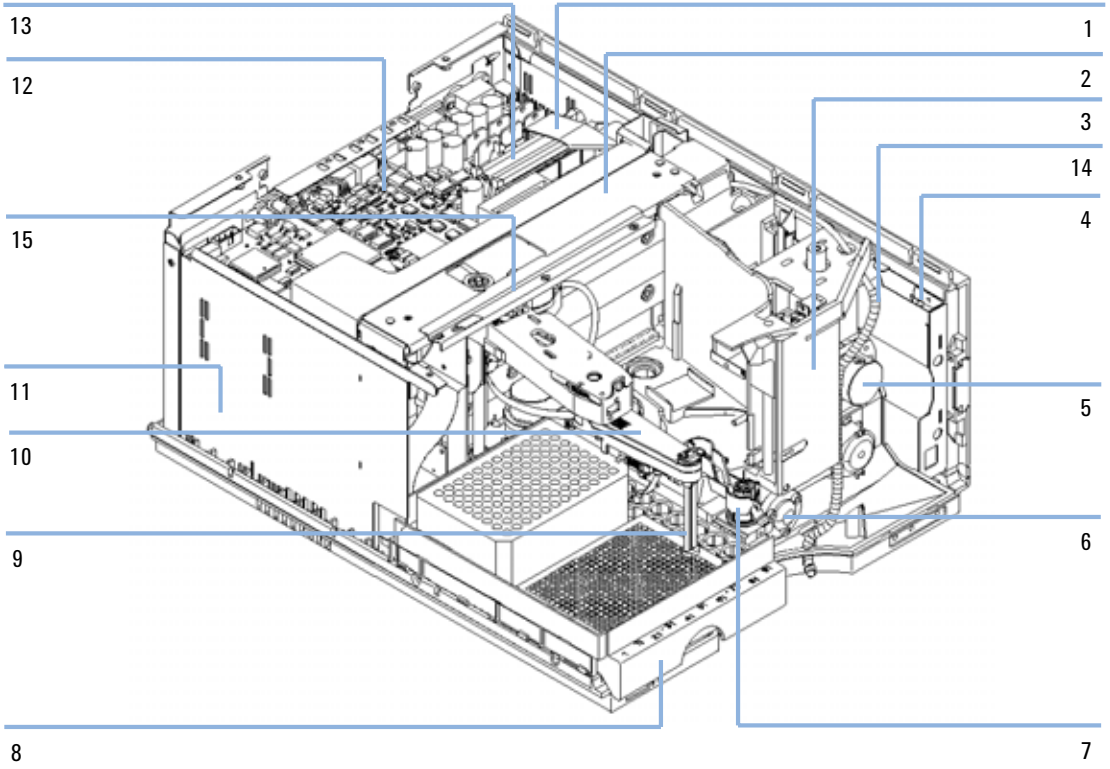


Figure 31 Autosampler Main Assemblies,

Table 47 Autosampler Main Assemblies

Item	Description	Part Number
1	Ribbon Cable (from SU to MTP)	**G1313-81602**
2	Sample Transport assembly for G1367B/D Sample Transport assembly for G1377A	**G1367-60019** **G1377-60009**

Table 47 Autosampler Main Assemblies

Item	Description	Part Number
3	Sampling Unit assembly for G1367B Sampling Unit assembly for G1367D Sampling Unit assembly for G1377A (The assy comes without injection valve and analytical head)	**G1367-60008** **G1367-60028** **G1377-60008**
4	SLS board (not shown)	**G1367-66505**
5	Analytical Head assembly (100 µl) for G1367B Analytical Head assembly (40 µl) for G1367D Analytical Head assembly (40 µl) for G1377A	**G1367-60003** **G1377-60023** **G1377-60013**
6	Injection Valve assembly for G1367B Injection Valve assembly for G1367D Micro Injection valve assembly for G1377A	**0101-0921** **0101-1422** **0101-1050**
7	Needle Seat assy for G1367B	**G1367-87101**
	Needle Seat assy for G1367D (without capillary) Seat cap. (0.12 mm) for G1377-87104 Needle Seat Seat cap. (0.17 mm) for G1377-87104 Needle Seat	**G1367-87105** **G1367-87303** **G1367-87302**
	Needle Seat assy for G1377A (without capillary) Seat cap. (0.10 mm ID) for G1377-87101 Needle Seat Seat cap. (0.075 mm) for G1377-87101 Needle Seat Seat cap. (0.05 mml) for G1377-87101 Needle Seat	**G1377-87101** **G1375-87317** **G1375-87316** **G1375-87300**
8	Plate Tray base	**G2258-60011**
9	Needle assy for G1367B/D Needle assy for G1377A	**G1367-87202** **G1377-87201**
10	Needle Carrier assembly	**G1367-60010**
11	Power supply assembly (not visible)	**0950-2528**
12	Autosampler Main Board (MTP) Exchange Assembly - MTP board	**G1367-66520** **G1367-69520**
13	Ribbon Cable (from ST to MTP) Ribbon Cable (from SLS to MTP) (not visible)	**G1364-81601** **G1367-81600**
14	Loop capillary for G1367B Loop capillary for G1367D Loop capillary for G1377A (8µl injection volume) Loop capillary for G1377A (40µl injection volume)	**G1367-60007** **G1377-87310** **G1375-87315** **G1377-87300**

Table 47 Autosampler Main Assemblies

Item	Description	Part Number
15	Illumination assembly for sampler	**G1367-60040**
	Sampler-TCC cap. (380 mm, 0.17 mm id) for G1367/68A Sampler-TCC cap. (500 mm, 0.05 mm id) for G1377/78A	**01090-87306** **G1375-87304**
	Fan (not visible)	**3160-1017**
	Fan exhaust (not visible)	**3160-4097**
	BCD board (not visible)	**G1351-68701**

Vial Trays,

Table 48 Autosampler Vial Trays and Tray Base

Item	Description	Part Number
1	Tray for 2 plates + 10 × 2-ml vials	**G2258-60011**
2	Screws for springs	**0515-0866**
3	Spring	**G1313-09101**
4	Spring stud	**0570-1574**
5	Tray base (includes items 4,5,6)	**G1329-60000**
6	Adapter air channel	**G1329-43200**
	Plug channel (not shown)	**G1367-47200**

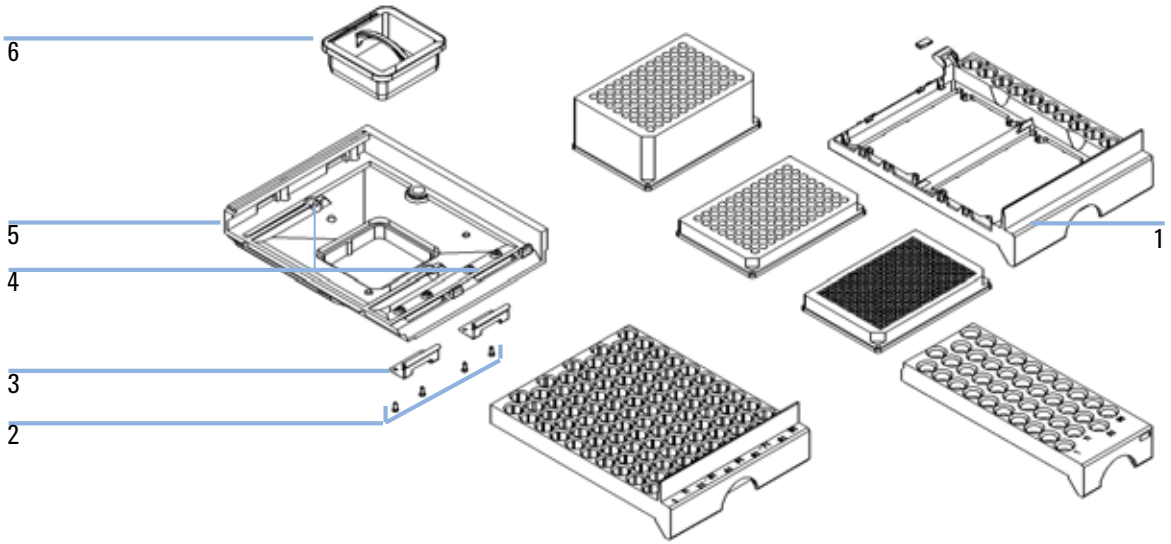


Figure 32 Vial trays and Tray Base

Table 49 Recommended plates and closing mat

Description	Rows	Columns	Plate height	Volume (µl)	Part Number	Package
384Agilent	16	24	14.4	80	5042-1388	30
384Corning	16	24	14.4	80	No Agilent PN	
384Nunc	16	24	14.4	80	No Agilent PN	
96Agilent	8	12	14.3	400	**5042-1386** **5042-1385**	10 120
96Agilent conical	8	12	17.3	150	**5042-8502**	25
96CappedAgilent	8	12	47.1	300	**5065-4402**	1
96Corning	8	12	14.3	300	No Agilent PN	
96CorningV	8	12	14.3	300	No Agilent PN	
96DeepAgilent31mm	8	12	31.5	1000	**5042-6454**	50
96DeepNunc31mm	8	12	31.5	1000	No Agilent PN	
96DeepRitter41mm	8	12	41.2	800	No Agilent PN	
96Greiner	8	12	14.3	300	No Agilent PN	
96GreinerV	8	12	14.3	250	No Agilent PN	
96Nunc	8	12	14.3	400	No Agilent PN	
Closing mat for all 96 Agilent plates	8	12			**5042-1389**	50

Table 50 Recommended Vial plates

Description	Part Number
Vial plate for 54x2ml vials (6/pk)	**G2255-68700**
Vial plate for 15x6ml vials (1/pk)	**5022-6539**
Vial plate for 27 Eppendorf tubes (1/pk)	**5022-6538**

High Performance Autosampler and SL+ Version Accessory Kit G1367-68705, ,

Table 51 High Performance Autosampler and SL+ version Accessory Kit G1367-68705

Description	Quantity	Part Number
Capillary sampler-column (380 mm, 0.17 mm ID)	1	**01090-87306**
96 well plate 0.5 ml, PP (pack of 10)	1	**5042-1386**
Tubing assembly	1	**5063-6527**
Filter kit	1	**5064-8240**
CAN cable, 1 m	1	**5181-1519**
Vials, screw cap 100/pk	1	**5182-0716**
Blue screw caps 100/pk	1	**5182-0717**
Hex key 9/64 inch (for injection-valve screws)	1	**8710-0060**
Wrench, 4 mm both ends	2	**8710-1534**
Rheotool socket wrench 1/4 inch	1	**8710-2391**
Hex key 4.0 mm, 15 cm long, T-handle	1	**8710-2392**
Hex key 9/64 inch, 15 cm long, T-handle	1	**8710-2394**
Hex key 2.0 mm	1	**8710-2438**
ESD wrist strap	1	**9300-1408**
Air channel adapter	1	**G1329-43200**
Capillary WPS to column (250 mm, 0.17 mm ID)	1	**G1367-87304**
WPS leak kit	1	**G1367-60006**
Tool for micro seat capillary	1	**G1377-44900**

Micro Well Plate Autosampler Accessory Kit G1377-68705, ,

Table 52 Micro Well Plate Autosampler Accessory Kit Contents G1377-68705

Description	Quantity	Part Number
96 well plate 0.5 ml, PP (pack of 10)	1	**5042-1386**
Tubing assembly	1	**5063-6527**
Filter kit	1	**5064-8240**
CAN cable, 1 m	1	**5181-1519**
Vials, screw cap 100/pk	1	**5182-0716**
Blue screw caps 100/pk	1	**5182-0717**
Valve catalog	1	**5988-2999**
Hex key 9/64 inch (for injection-valve screws)	1	**8710-0060**
Wrenches 1/4 –– 5/16 inch	2	**8710-0510**
Wrench 4.0 mm open end	1	**8710-1534**
Rheotool socket wrench 1/4 inch	1	**8710-2391**
Hex key 4.0 mm, 15 cm long, T-handle	1	**8710-2392**
Hex key 9/64 inch, 15 cm long, T-handle	1	**8710-2394**
Hex key 2.5 mm, 15 cm long, straight handle	1	**8710-2412**
Hex key 2.0 mm	1	**8710-2438**
Torque adapter	1	**G1315-45003**
Air channel adapter	1	**G1329-43200**
Capillary sampler-column (500 mm, 0.05 mm ID)	1	**G1375-87304**
40 µl Loop capillary	1	**G1377-87300**
WPS leak kit	1	**G1367-60006**
Seat capillary (150 mm, 0.075 mm ID)	1	**G1367-87316**
Tool for micro seat capillary	1	**G1377-44900**

Multi-Draw Kit G1313-68711 (Only For G1367B), , , ,

Table 53 Multi-Draw Kit

Item	Description	Part Number
1	Seat capillary, 500 µl, 0.5 mm id	**G1313-87307**
2	Seat capillary, 1500 µl, 0.9 mm id	**G1313-87308**
3	Union	**0100-0900**

G1373A Injector Purge Kit Parts,

Table 54 Injector Purge Kit Parts for G1367B Autosamplers

Description	Part Number
Plastic cover cabinet kit with rail (includes top and side covers and the bolt carrier for mounting the front door).	**5064-1533**
6-Position-7-Ports 1200 Series CAN valve Assay (Reorder number, for repairs, only)	**G1156-60001**
Stator for G1156A valve	**0101-1410**
1-Groove Rotor seal for G1156A valve	**0101-1411**
Wellplate Autosampler Purge Accessory kit (not orderable separately), includes items 6-22	**G1373-68705**
2x Solvent bottle, clear glass, 1l	**9301-1420**
2x Bottle head assembly	**G1311-60003**
Tubing Set 100 cm (2x, for solvent connection from degasser to the purge valve)	**G1373-67300**
2x PEEK Adapter for tubing from degasser to valve port	**0100-1847**
Blanking Nut SST	**01080-83202**
Flexible Capillary 0.25 mm ID, length 320 mm	**5065-9980**
1/16” front ferrules for SST capillaries, 1/16” back ferrules for SST capillaries,Fitting Screw long, pack of 10	**5065-4454**
3-groove Rotor seal for max. 600 bar (G1367D WPS injection valve, purge kit setup)	**0101-1409**
Restriction capillary for injection valve waste outlet	**G1373-87300**
CAN cable, 1 m long (for 1200 Series module to module CAN connections)	**5181-1519**
DC CAN cable (to supply power to the G1156A valve from e.g. the G1367B WP-ALS)	**5181-1533**
Rheotool socket wrench	**8710-2391**

Table 54 Injector Purge Kit Parts for G1367B Autosamplers

Description	Part Number
9/64” Hex key driver	**8710-2394**
Priming Syringe (for solvent inlet tubing, reorder number, pack of 10)	**5062-8534**
Syringe Adapter for priming syringe	**9301-1337**
ChemStation CD ROM Rev. B.01.03 or higher for the use of this kit	N/A
Installation Note (this note)	N/A

Thermostat for ALS / FC / Spotter

Table 55 Thermostat for ALC / FC / Spotter

Item	Description	Part Number
1	Thermostat, exchange assembly	G1330-69040

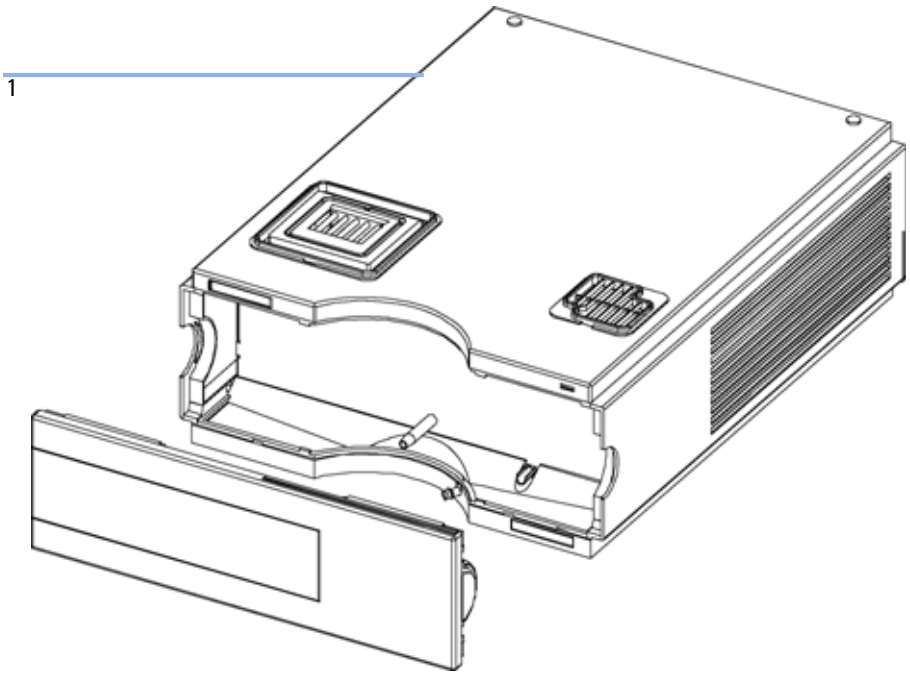


Figure 33 Thermostat for ALS / FC / Spotter

11 Parts for Repair

Sampling Unit Assembly, 266
Analytical-Head Assembly, 269
Injection-Valve Assembly, , 272
Sheet Metal Kit, 274
Cover Parts, , 275
Foam Parts, 276
Power and Status Light Pipes, 278
Leak System Parts, 279

Sampling Unit Assembly,

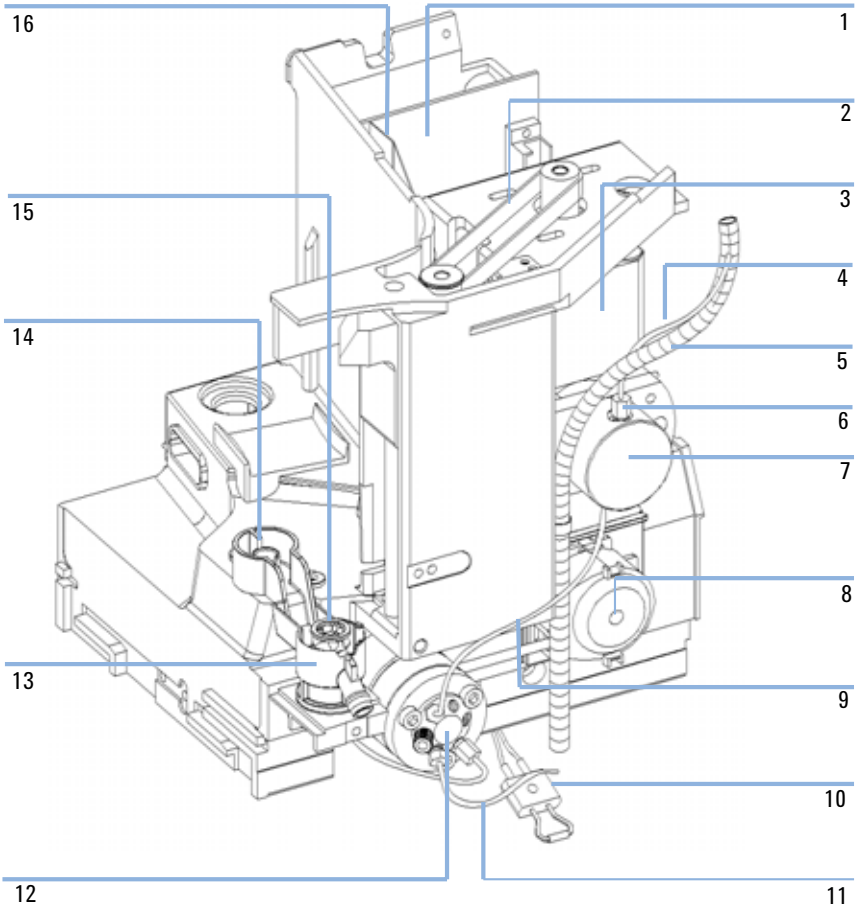


Figure 34 High performance autosampler, High performance autosampler SL+ and Micro well plate sampler sampling unit

Table 56 , Autosampler sampling unit

Item	Description	Part Number
	Sampling Unit assembly for G1367B Sampling Unit assembly for G1367D Sampling Unit assembly for G1377A (The assy comes without injection valve and analytical head)	**G1367-60008** **G1367-60028** **G1377-60008**
1	Sampling unit connector board (SUD)	**G1313-66503**
2	Belt gear for metering unit and needle arm	**1500-0697**
3	Stepper motor for metering unit and needle arm	**5062-8590**
4	Loop capillary, 100 µl for G1367B Loop capillary, 40 µl for G1367D Loop capillary, 40 µl for G1377A Loop capillary, 8 µl for G1377A	**G1367-87300** **G1377-87310** **G1377-87300** **G1375-87315**
5	Loop capillary waste tube	**G1367-60007**
6	Seal tight nut for G1367-87300 and G1377-87300 capillaries	**5067-1540**
7	Analytical Head assembly 100 µl for G1367B Analytical Head assembly 40 µl for G1367D Analytical Head assembly 40 µl for G1377A	**G1367-60003** **G1377-60023** **G1377-60013**
8	Peristaltic pump, includes tubing	**5065-4445**
9	Inj-Valve-Anal Head cap (160 mm 0.25 mm ID) for G1367B/D Inj-Valve-Anal Head cap (200 mm 0.10 mm ID) for G1377A	**G1313-87301** **G1375-87312**
10	Leak sensor	**5061-3356**
11	Waste tube for G1367B/D Waste tube for G1377A	**G1313-87300** **G1377-87301**
12	Injection Valve assembly for G1367B Injection Valve assembly for G1367D Micro Injection Valve assembly for G1377A	**0101-0921** **0101-1422** **0101-1050**
13	Seat adapter	**G1367-43200**
14	Flush port	**G1367-47700**

Table 56 , Autosampler sampling unit

Item	Description	Part Number
15	Needle-Seat assy (150 mm 0.17 mm ID) for G1367B	**G1367-87101**
	Needle-Seat (without capillary) for G1367D	**G1367-87104**
	Needle-Seat (without capillary) for G1377A	**G1377-87105**
	Seat capillary (150 mm 0.10 mm ID) for G1377-87101 Needle Seat	**G1375-87317**
	Seat capillary (150 mm 0.075 mm ID) for G1377-87101 Needle Seat	**G1375-87316**
	Seat capillary (150 mm 0.05 mm ID) for G1377-87101 Needle Seat	**G1375-87300**
	Seat capillary (150 mm 0.12 mm ID) for G1367-87104 Needle Seat	**G1367-87303**
	Seat capillary (150 mm 0.17 mm ID) for G1367-87104 Needle Seat	**G1367-87302**
16	Flex board	**G1313-68715**
	Air barrier (not visible)	**G1367-44105**
	Stepper motor peristaltic pump (not visible)	**5065-4409**
	Motor holder (not visible)	**G1367-42304**
	Plate peristaltic pump (not visible)	**G1367-44100**

Analytical-Head Assembly,

Table 57 Analytical-Head Assembly 100 µl, for G1367B

Item	Description	Part Number
	Analytical head assembly 100 µl, for G1367B includes items 1 – 6	**G1367-60003**
1	Screws	**0515-0850**
2	Plunger assembly for G1367B	**5063-6586**
3	Seal support assembly for G1367B	**5001-3739**
4	Metering seal (pack of 2) for G1367B,	**5063-6589**
5	Head body	**01078-27710**
	Screw M5, 60 mm lg, for mounting of assembly	**0515-2118**

Table 58 Analytical-Head Assembly 40 µl, for G1367D

Item	Description	Part Number
	Micro Analytical head assembly 40 µl, for G1367D includes item 1 - 6	**G1377-60023**
1	Screws	**0515-0850**
2	Micro plunger assembly for G1367D	**5064-8293**
3	Seal support assembly for G1367D	**G1377-60012**
	PEEK backup ring	**G1377-24001**
4	Micro metering seal (pack of 1) for G1367D	**5022-2175**
5	Head body for G1367D	**G1377-27700**

Table 58 Analytical-Head Assembly 40 µl, for G1367D

Item	Description	Part Number
	Screw M5, 60 mm lg, for mounting of assembly	**0515-2118**

Table 59 Micro analytical head assembly 40 µl, for G1377A

Item	Description	Part Number
	Micro Analytical head assembly 40 µl, for G1377A includes item 1 - 6	**G1377-60013**
1	Screws	**0515-0850**
2	Micro plunger assembly for G1377A	**5064-8293**
3	Micro seal support assembly for G1377A	**G1377-60002**
4	Micro metering seal (pack of 1) for G1377A	**5022-2175**
5	Head body for G1377A	**G1377-27700**
	Screw M5, 60 mm lg, for mounting of assembly	**0515-2118**

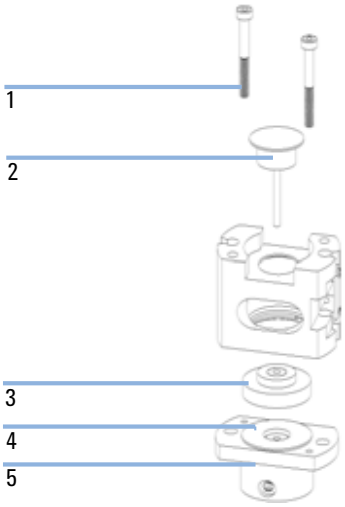


Figure 35 Analytical-Head Assembly (100 µl or 40 µl)

Injection-Valve Assembly, ,

Table 60 Injection valve assembly for G1367B

Item	Description	Part Number
1	Injection-valve assembly, includes items 1 – 6	**0101-0921**
2	Isolation seal	**0100-1852**
3	Rotor seal (Vespel),	**0100-1853**
3	Rotor seal (Tefzel)	**0100-1849**
3	Rotor seal (PEEK)	**0100-2231**
4	Stator face	**0100-1851**
5	Stator head	**0100-1850**
6	Stator screws	**1535-4857**

Table 61 Micro injection valve for G1377A The Micro injection valve assembly has no ceramic stator face.

Item	Description	Part Number
1	Micro injection-valve assembly, incl. items 1 - 2- 3 - 5 - 6	**0100-1050**
2	Isolation seal	**0100-1852**
3	Micro Rotor seal (Vespel), (includes 3 screws)	**0100-2088**
5	Micro stator head	**0100-2089**
6	Stator screws	**1535-4857**

Table 62 Injection-Valve Assembly for G1367D (600 bar) The injection valve assembly for G1367D has no ceramic stator.

Item	Description	Part Number
1	Injection-valve assembly, includes items 1 – 6	**0101-1422**
2	Isolation seal	**0100-1852**
3	Rotor seal (PEEK) (includes 3 screws)	**0101-1416**
5	Stator head	**0101-1417**
6	Stator screws	**1535-4857**

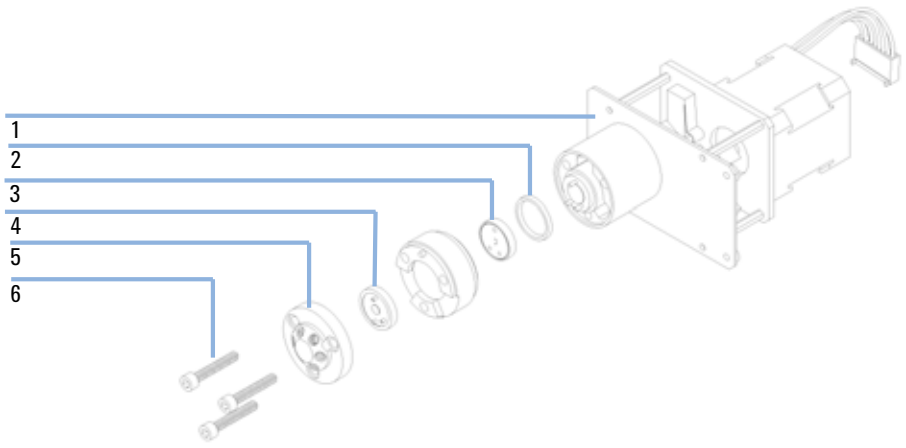


Figure 36 Injection-Valve Assembly

Sheet Metal Kit,

Table 63 Sheet Metal

Item	Description	Part Number
1	Slot cover	**5001-3772**
2	Screw cover	**5022-2112**
3	Sampler sheet metal kit	**G1367-68701**

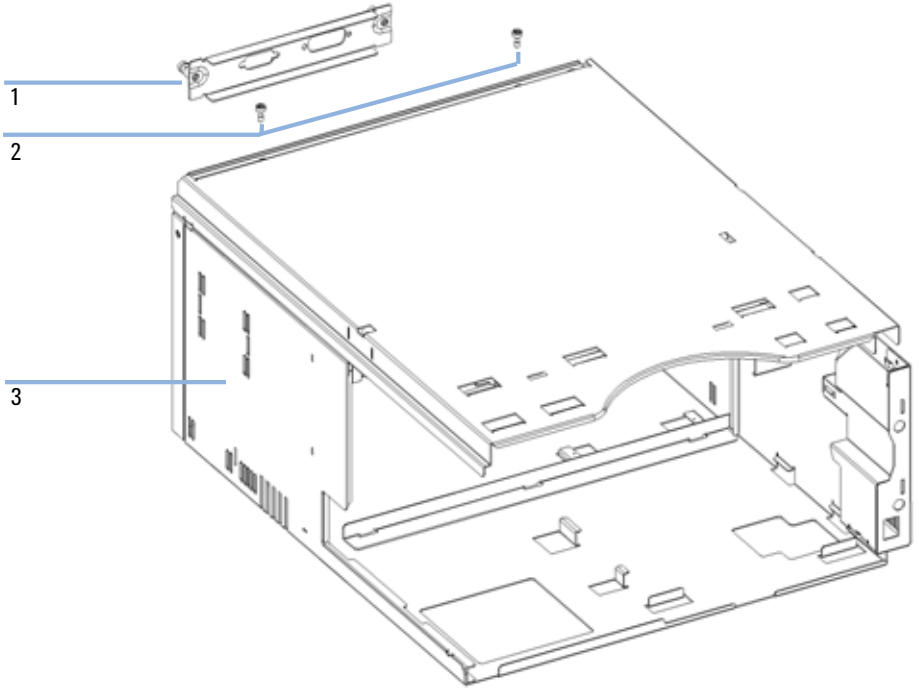


Figure 37 Sheet Metal Kit

Cover Parts, ,

Table 64 Covers

Item	Description	Part Number
1	Cabinet kit, includes base, side panels, top and front cover Cabinet kit, includes base, side panels, top and front cover (When injector purge kit is installed)	**5067-1556** **5067-1533**
	Name plate for Agilent 1200 Series	**5042-8901**
	Light protection kit, includes dark front cover and side window	**5067-1552**

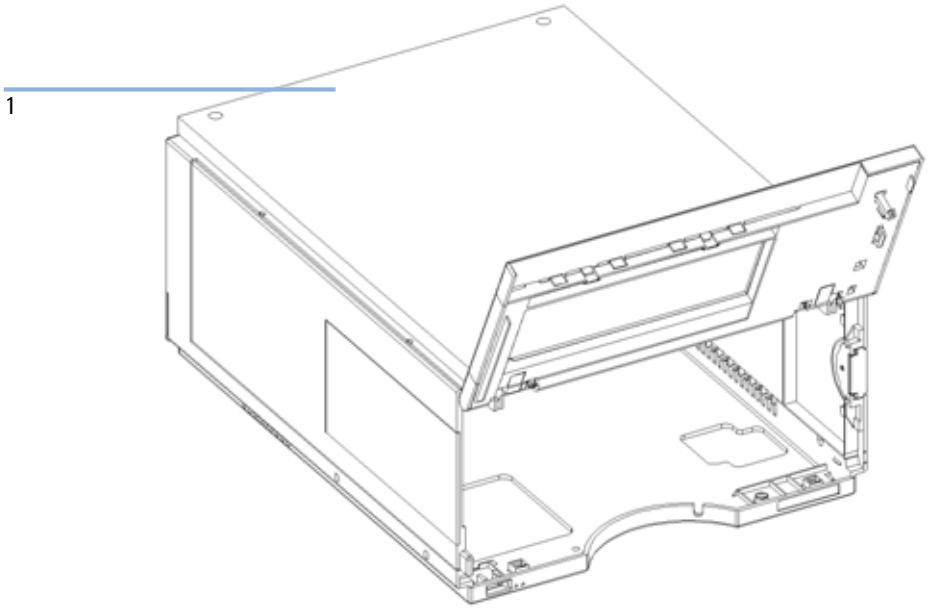


Figure 38 Cover Parts

Foam Parts,

Table 65 Foam Parts

Item	Description	Part Number
	Foam kit, includes items 2 and 3	**5064-8248**
1	Board guides	**5041-8395**
2	Top foam	Order foam kit
3	Bottom foam	Order foam kit

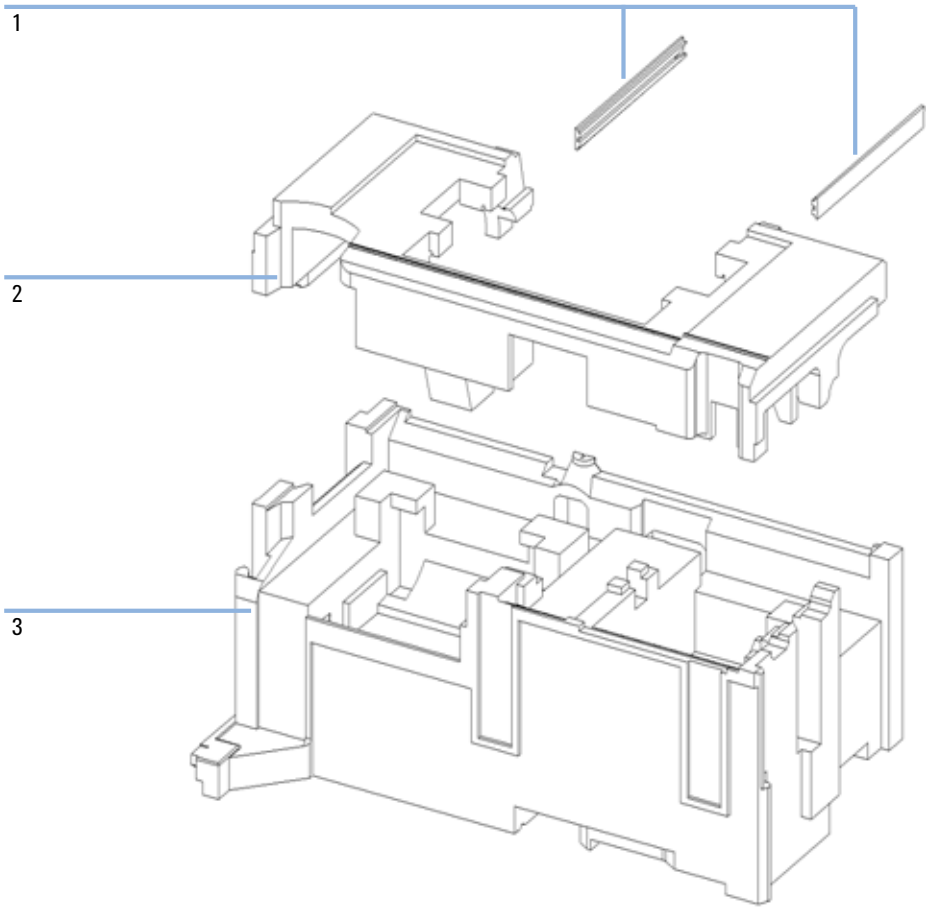


Figure 39 Foam Parts

Power and Status Light Pipes,

Table 66 Power and Status Light Pipes

Item	Description	Part Number
1	Light pipe — power switch	**5041-8382**
2	Power switch button	**5041-8381**
3	Light pipe — status lamp	**5041-8384**
4	Power switch coupler	**5041-8383**

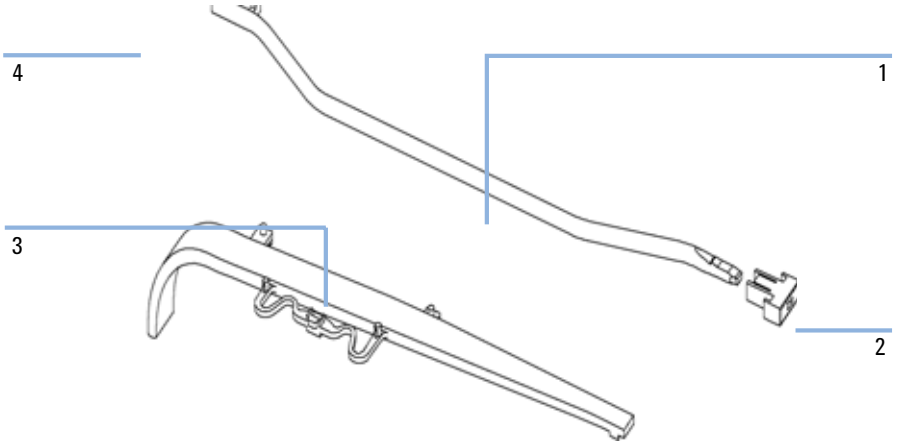


Figure 40 Power and Status Light Pipes

Leak System Parts,

Table 67 Leak System Parts

Item	Description	Part Number
1	Leak sensor	**5061-3356**
2	Leak plane	**G1313-44501**
3	Leak tubing 120 mm[1]	**5062-2463**
4	Leak funnel	**5041-8388**

1 reorder gives 5 m

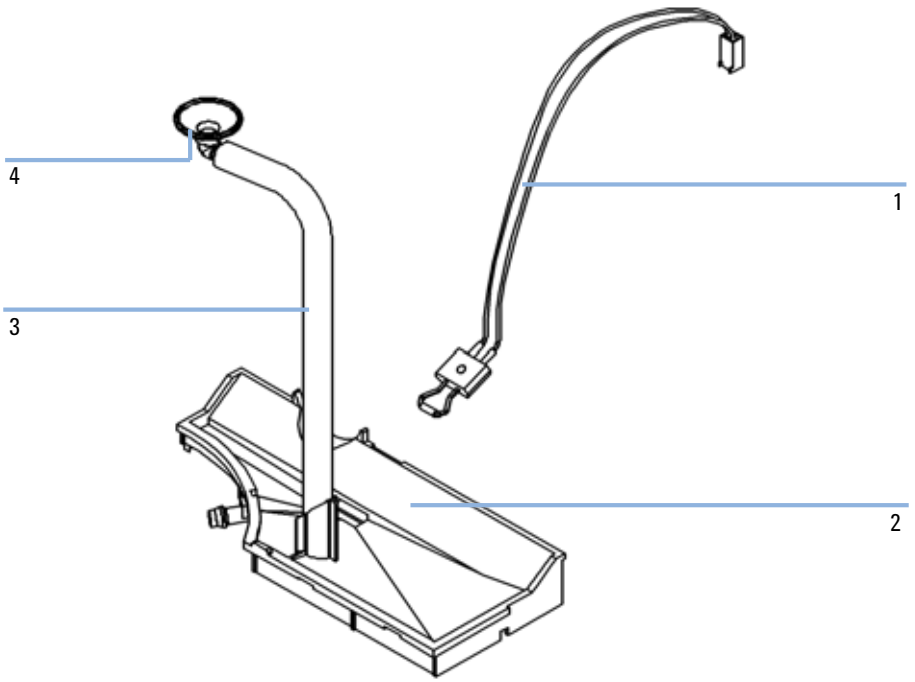


Figure 41 Leak System Parts

12 Cable Identification

Cable Overview 282
Analog Cables, 284
Remote Cables, 287
BCD Cables, 294
Auxiliary Cable, 296
CAN Cable, 297
External Contact Cable, 298
RS-232 Cable Kit, 299
LAN Cables, 300

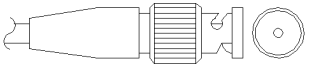
Cable Overview

NOTE Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.

Type	Description	Part Number
Analog cables,	3390/2/3 integrators	**01040-60101**
	3394/6 integrators	**35900-60750**
	Agilent **35900A** A/D converter	**35900-60750**
	General purpose (spade lugs)	**01046-60105**
Remote cables,	3390 integrator	**01046-60203**
	3392/3 integrators	**01046-60206**
	3394 integrator	**01046-60210**
	3396A (Series I) integrator	**03394-60600**
	3396 Series II / 3395A integrator, see details in section	
	3396 Series III / 3395B integrator	**03396-61010**
	HP 1050 modules / HP 1046A FLD	**5061-3378**
	HP 1046A FLD	**5061-3378**
	Agilent **35900A** A/D converter	**5061-3378**
	HP 1040 diode-array detector	**01046-60202**
	HP 1090 liquid chromatographs	**01046-60202**
	Signal distribution module	**01046-60202**
, , *BCD cables*	3396 integrator	**03396-60560**
	General purpose (spade Lugs)	**G1351-81600**
, *Auxiliary*	Agilent 1100 Series vacuum degasser	**G1322-61600**

Type	Description	Part Number
CAN cables	Agilent 1100/1200 module to module,0.5m lg Agilent 1100/1200 module to module, 1m lg	**5181-1516** **5181-1519**
, External contacts	Agilent 1100/1200 Series interface board to general purpose	**G1103-61611**
, GPIB cable	Agilent 1100/1200 module to ChemStation, 1 m Agilent 1100/1200 module to ChemStation, 2 m	**10833A** **10833B**
RS-232 cable	Agilent 1100/1200 module to a computer This kit contains a 9-pin female to 9-pin female Null Modem (printer) cable and one adapter.	**34398A**
LAN cable	Twisted pair cross over LAN cable, (shielded 3m long) (for point to point connection)	**5023-0203**
	Twisted pair cross over LAN cable, (shielded 7m long) (for point to point connection)	**5023-0202**

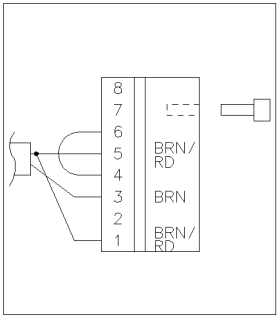
Analog Cables,



One end of these cables provides a BNC connector to be connected to Agilent 1100/1200 Series modules. The other end depends on the instrument to which connection is being made.

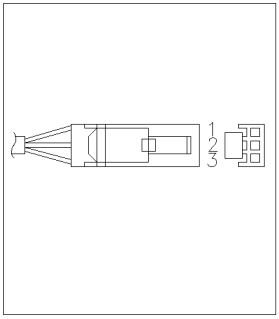
Agilent 1100 / 1200 to 3390 / 2 / 3 Integrators

Table 68

Connector01040-60101	Pin 3390 / 2 / 3	Pin Agilent 1100 / 1200	Signal Name
	1	Shield	Ground
	2		Not connected
	3	Center	Signal +
	4		Connected to pin 6
	5	Shield	Analog -
	6		Connected to pin 4
	7		Key
	8		Not connected

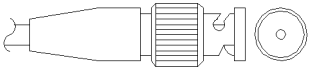
Agilent 1100 / 1200 to 3394 / 6 Integrators

Table 69

Connector35900-60750	Pin 3394 / 6	Pin Agilent 1100 / 1200	Signal Name
	1		Not connected
	2	Shield	Analog -
	3	Center	Analog +

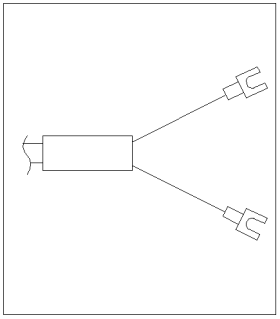
Agilent 1100 / 1200 to BNC Connector

Table 70

Connector8120-1840	Pin BNC	Pin Agilent 1100 / 1200	Signal Name
	Shield	Shield	Analog -
	Center	Center	Analog +

Agilent 1100 / 1200 to General Purpose

Table 71

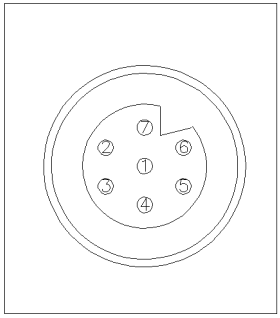
Connector01046-60105	Pin 3394 / 6	Pin Agilent 1100 / 1200	Signal Name
	1		Not connected
	2	Black	Analog -
	3	Red	Analog +

Remote Cables,

One end of these cables provides a Agilent Technologies APG (Analytical Products Group) remote connector to be connected to Agilent 1100/1200 Series modules. The other end depends on the instrument to be connected to.

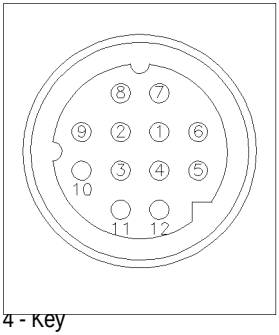
Agilent 1100 / 1200 to 3390 Integrators

Table 72

Connector01046-60203	Pin 3390	Pin Agilent 1100 / 1200	Signal Name	Active (TTL)
	2	1 - White	Digital ground	
	NC	2 - Brown	Prepare run	Low
	7	3 - Gray	Start	Low
	NC	4 - Blue	Shut down	Low
	NC	5 - Pink	Not connected	
	NC	6 - Yellow	Power on	High
	NC	7 - Red	Ready	High
	NC	8 - Green	Stop	Low
	NC	9 - Black	Start request	Low

Agilent 1100 / 1200 to 3392 / 3 Integrators

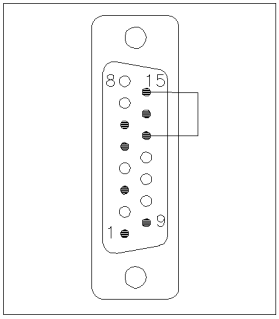
Table 73

Connector01046-60206	Pin 3392 / 3	Pin Agilent 1100 / 1200	Signal Name	Active (TTL)
	3	1 - White	Digital ground	
	NC	2 - Brown	Prepare run	Low
	11	3 - Gray	Start	Low
	NC	4 - Blue	Shut down	Low
	NC	5 - Pink	Not connected	
	NC	6 - Yellow	Power on	High
	9	7 - Red	Ready	High
	1	8 - Green	Stop	Low
	NC	9 - Black	Start request	Low

4 - Key

Agilent 1100 / 1200 to 3394 Integrators

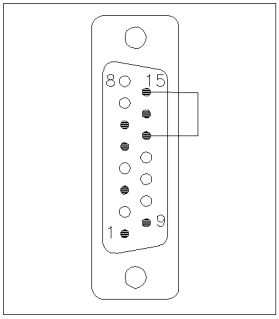
Table 74

Connector01046-60210	Pin 3394	Pin Agilent 1100 / 1200	Signal Name	Active (TTL)
	9	1 - White	Digital ground	
	NC	2 - Brown	Prepare run	Low
	3	3 - Gray	Start	Low
	NC	4 - Blue	Shut down	Low
	NC	5 - Pink	Not connected	
	NC	6 - Yellow	Power on	High
	5,14	7 - Red	Ready	High
	6	8 - Green	Stop	Low
	1	9 - Black	Start request	Low
	13, 15		Not connected	

NOTE START and STOP are connected via diodes to pin 3 of the 3394 connector.

Agilent 1100 / 1200 to 3396A Integrators

Table 75

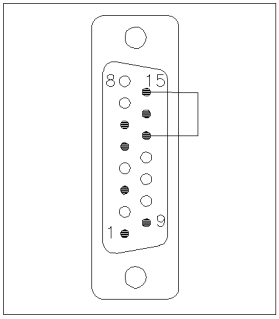
Connector03394-60600	Pin 3394	Pin Agilent 1100 / 1200	Signal Name	Active (TTL)
	9	1 - White	Digital ground	
	NC	2 - Brown	Prepare run	Low
	3	3 - Gray	Start	Low
	NC	4 - Blue	Shut down	Low
	NC	5 - Pink	Not connected	
	NC	6 - Yellow	Power on	High
	5,14	7 - Red	Ready	High
	1	8 - Green	Stop	Low
	NC	9 - Black	Start request	Low
	13, 15		Not connected	

Agilent 1100 / 1200 to 3396 Series II / 3395A Integrators

Use the cable **part number: 03394-60600** and cut pin #5 on the integrator side. Otherwise the integrator prints START; not ready.

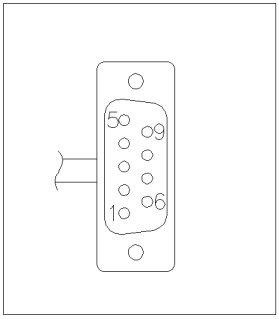
Agilent 1100 / 1200 to 3396 Series III / 3395B Integrators

Table 76

Connector03396-61010	Pin 33XX	Pin Agilent 1100 / 1200	Signal Name	Active (TTL)
	9	1 - White	Digital ground	
	NC	2 - Brown	Prepare run	Low
	3	3 - Gray	Start	Low
	NC	4 - Blue	Shut down	Low
	NC	5 - Pink	Not connected	
	NC	6 - Yellow	Power on	High
	14	7 - Red	Ready	High
	4	8 - Green	Stop	Low
	NC	9 - Black	Start request	Low
	13, 15		Not connected	

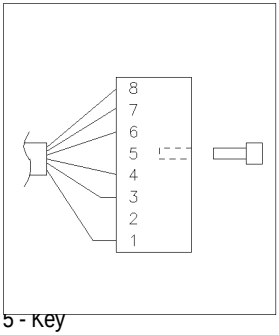
Agilent 1100 / 1200 to HP 1050, HP 1046A or Agilent 35900 A / D Converters

Table 77

Connector5061-3378	Pin HP 1050 /	Pin Agilent 1100 / 1200	Signal Name	Active (TTL)
	1 - White	1 - White	Digital ground	
	2 - Brown	2 - Brown	Prepare run	Low
	3 - Gray	3 - Gray	Start	Low
	4 - Blue	4 - Blue	Shut down	Low
	5 - Pink	5 - Pink	Not connected	
	6 - Yellow	6 - Yellow	Power on	High
	7 - Red	7 - Red	Ready	High
	8 - Green	8 - Green	Stop	Low
	9 - Black	9 - Black	Start request	Low

Agilent 1100 / 1200 to HP 1090 LC or Signal Distribution Module

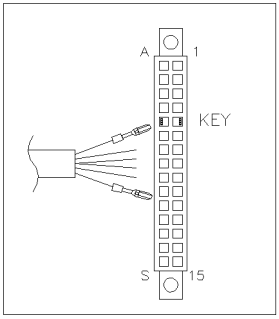
Table 78

Connector01046-60202	Pin HP 1090	Pin Agilent 1100 / 1200	Signal Name	Active (TTL)
	1	1 - White	Digital ground	
	NC	2 - Brown	Prepare run	Low
	4	3 - Gray	Start	Low
	7	4 - Blue	Shut down	Low
	8	5 - Pink	Not connected	
	NC	6 - Yellow	Power on	High
	3	7 - Red	Ready	High
	6	8 - Green	Stop	Low
	NC	9 - Black	Start request	Low

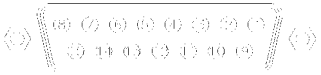
5 - Key

Agilent 1100 / 1200 to General Purpose

Table 79

Connector01046-60201	Pin Universal	Pin Agilent 1100 / 1200	Signal Name	Active (TTL)
		1 - White	Digital ground	
		2 - Brown	Prepare run	Low
		3 - Gray	Start	Low
		4 - Blue	Shut down	Low
		5 - Pink	Not connected	
		6 - Yellow	Power on	High
		7 - Red	Ready	High
		8 - Green	Stop	Low
		9 - Black	Start request	Low

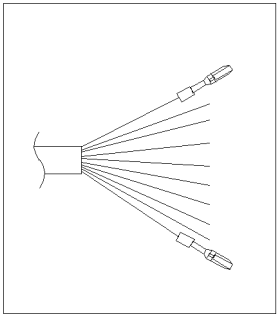
BCD Cables,



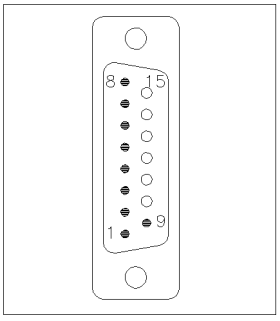
One end of these cables provides a 15-pin BCD connector to be connected to the Agilent 1100/1200 Series modules. The other end depends on the instrument to be connected to

Agilent 1100 / 1200 to General Purpose

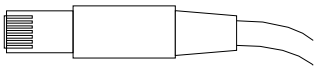
Table 80

ConnectorG1351-81600	Wire Color	Pin Agilent 1100 / 1200	Signal Name	BCD Digit
	Green	1	BCD 5	20
	Violet	2	BCD 7	80
	Blue	3	BCD 6	40
	Yellow	4	BCD 4	10
	Black	5	BCD 0	1
	Orange	6	BCD 3	8
	Red	7	BCD 2	4
	Brown	8	BCD 1	2
	Gray	9	Digital ground	Gray
	Gray / pink	10	BCD 11	800
	Red / blue	11	BCD 10	400
	White / green	12	BCD 9	200
	Brown / green	13	BCD 8	100
	not connected	14		
	not connected	15	+5 Vt	Low

Agilent 1100 / 1200 to 3396 Integrators

Connector03396-60560	Pin 3392 / 3	Pin Agilent 1100 / 1200	Signal Name	BCD Digit
	1	1	BCD 5	20
	2	2	BCD 7	80
	3	3	BCD 6	40
	4	4	BCD 4	10
	5	5	BCD 0\	1
	6	6	BCD 3	8
	7	7	BCD 2	4
	8	8	BCD 1	2
	9	9	Digital ground	
	NC	15	+ 5 V	Low

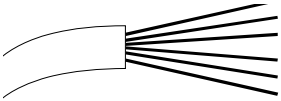
Auxiliary Cable,



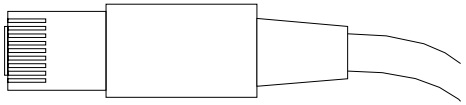
One end of this cable provides a modular plug to be connected to the Agilent 1100 Series vacuum degasser. The other end is for general purpose.

Agilent 1100 Series Degasser to general purposes

Table 81

ConnectorG1322-81600	Color	Pin Agilent 1100	Signal Name
	White	1	Ground
	Brown	2	Pressure signal
	Green	3	
	Yellow	4	
	Grey	5	DC + 5 V IN
	Pink	6	Vent

CAN Cable,

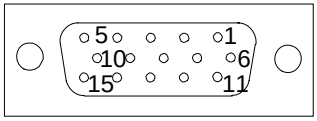


Both ends of this cable provide a modular plug to be connected to Agilent 1100/1200 Series module's CAN-bus connectors.

Table 82

Agilent 1100/1200 module to module, 0.5m lg	**5181-1516**
Agilent 1100/1200 module to module, 1m lg	**5181-1519**

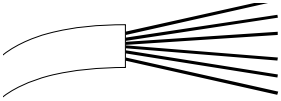
External Contact Cable,



One end of this cable provides a 15-pin plug to be connected to Agilent 1100/1200 Series module's interface board. The other end is for general purpose.

Agilent 1100 / 1200 Series Interface Board to general purposes

Table 83

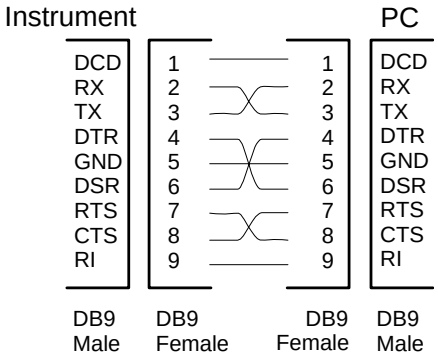
ConnectorG1103-61611	Color	Pin Agilent 1100 / 1200	Signal Name
	White	1	EXT 1
	Brown	2	EXT 1
	Green	3	EXT 2
	Yellow	4	EXT 2
	Grey	5	EXT 3
	Pink	6	EXT 3
	Blue	7	EXT 4
	Red	8	EXT 4
	Black	9	Not connected
	Violet	10	Not connected
	Grey / pink	11	Not connected
	Red / blue	12	Not connected
	White / green	13	Not connected
	Brown / green	14	Not connected
	White / yellow	15	Not connected

RS-232 Cable Kit,

This kit contains a 9-pin female to 9-pin female Null Modem (printer) cable and one adapter. Use the cable and adapter to connect Agilent Technologies instruments with 9-pin male RS-232 connectors to most PCs or printers.

Agilent 1100 / 1200 module to PC

RS-232 Cable Kit 34398A



LAN Cables,

Recommended Cables

Table 84

Description	Part number
Cross-over network cable (shielded, 3 m long), (for point to point connection)	**5023-0203**
Twisted pair network cable (shielded, 7 m long) (for hub connections)	**5023-0202**

13 Appendix

General Safety Information 302
Lithium Batteries Information, , , 305
The Waste Electrical and Electronic Equipment Directive 306
Radio Interference 307
Sound Emission 308
Solvent Information 309
Agilent Technologies on the Internet 311

This appendix provides general safety and environmental information.

General Safety Information

General Safety Information

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Aligent Technologies assumes no liability for the customer's failure to comply with these requirements.

General

This is a Safety Class I instrument (provided with terminal for protective earthing) and has been manufactured and tested according to international safety standards.

Operation

Before applying power, comply with the installation section. Additionally the following must be observed.

Do not remove instrument covers when operating. Before the instrument is switched on, all protective earth terminals, extension cords, auto-transformers, and devices connected to it must be connected to a protective earth via a ground socket. Any interruption of the protective earth grounding will cause a potential shock hazard that could result in serious personal injury. Whenever it is likely that the protection has been impaired, the instrument must be made inoperative and be secured against any intended operation.

Make sure that only fuses with the required rated current and of the specified type (normal blow, time delay, and so on) are used for replacement. The use of repaired fuses and the short-circuiting of fuseholders must be avoided.

CAUTION

Ensure the proper usage of the equipment.

The protection provided by the equipment may be impaired.

➔ The operator of this instrument is advised to use the equipment in a manner as specified in this manual.

Some adjustments described in the manual, are made with power supplied to the instrument, and protective covers removed. Energy available at many points may, if contacted, result in personal injury.

Any adjustment, maintenance, and repair of the opened instrument under voltage should be avoided as much as possible. When inevitable, this should be carried out by a skilled person who is aware of the hazard involved. Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present. Do not replace components with power cable connected.

Do not operate the instrument in the presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

Do not install substitute parts or make any unauthorized modification to the instrument.

Capacitors inside the instrument may still be charged, even though the instrument has been disconnected from its source of supply. Dangerous voltages, capable of causing serious personal injury, are present in this instrument. Use extreme caution when handling, testing and adjusting.

When working with solvents please observe appropriate safety procedures (e.g. goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet by the solvent vendor, especially when toxic or hazardous solvents are used.

Safety Symbols

Table 85 Safety Symbols

Symbol	Description
	The apparatus is marked with this symbol when the user should refer to the instruction manual in order to protect risk of harm to the operator and to protect the apparatus against damage.
	Indicates dangerous voltages.
	Indicates a protected ground terminal.
	Indicates eye damage may result from directly viewing the light produced by the deuterium lamp used in this product.
	The apparatus is marked with this symbol when hot surfaces are available and the user should not touch it when heated up.

WARNING

A WARNING

alerts you to situations that could cause physical injury or death.

➔ Do not proceed beyond a warning until you have fully understood and met the indicated conditions.

CAUTION

A CAUTION

alerts you to situations that could cause loss of data, or damage of equipment.

➔ Do not proceed beyond a caution until you have fully understood and met the indicated conditions.

Lithium Batteries Information, , ,

WARNING

Lithium batteries may not be disposed-off into the domestic waste. Transportation of discharged Lithium batteries through carriers regulated by IATA / ICAO, ADR, RID, IMDG is not allowed.

Danger of explosion if battery is incorrectly replaced.

➔ Discharged Lithium batteries shall be disposed off locally according to national waste disposal regulations for batteries.

➔ Replace only with the same or equivalent type recommended by the equipment manufacturer.

WARNING

Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering.

Udskiftning må kun ske med batteri af samme fabrikat og type.

➔ Lever det brugte batteri tilbage til leverandøren.

WARNING

Lithiumbatteri - Eksplosionsfare.

Ved udskiftning benyttes kun batteri som anbefalt av apparatfabrikanten.

➔ Brukt batteri returneres appararleverandoren.

NOTE

Bij dit apparaat zijn batterijen geleverd. Wanneer deze leeg zijn, moet u ze niet weggooien maar inleveren als KCA.

The Waste Electrical and Electronic Equipment Directive

Abstract

The Waste Electrical and Electronic Equipment (WEEE) Directive (2002/96/EC), adopted by EU Commission on 13 February 2003, is introducing producer responsibility on all electric and electronic appliances starting with 13 August 2005.

NOTE

This product complies with the WEEE Directive (2002/96/EC) marking requirements. The affixed label indicates that you must not discard this electrical/electronic product in domestic household waste.

Product Category:

With reference to the equipment types in the WEEE Directive Annex I, this product is classed as a “Monitoring and Control Instrumentation” product.

NOTE

Do not dispose off in domestic household waste

To return unwanted products, contact your local Agilent office, or see www.agilent.com for more information.

Radio Interference

Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.

Test and Measurement

If test and measurement equipment is operated with equipment unscreened cables and/or used for measurements on open set-ups, the user has to assure that under operating conditions the radio interference limits are still met within the premises.

Sound Emission

Manufacturer's Declaration

This statement is provided to comply with the requirements of the German Sound Emission Directive of 18 January 1991.

This product has a sound pressure emission (at the operator position) < 70 dB.

- Sound Pressure Lp < 70 dB (A)
- At Operator Position
- Normal Operation
- According to ISO 7779:1988/EN 27779/1991 (Type Test)

Solvent Information

Flow Cell ,

To protect optimal functionality of your flow-cell:

- Avoid the use of alkaline solutions (pH > 9.5) which can attack quartz and thus impair the optical properties of the flow cell.
- If the flow cell is transported while temperatures are below 5 degree C, it must be assured that the cell is filled with alcohol.
- Aqueous solvents in the flow cell can built up algae. Therefore do not leave aqueous solvents sitting in the flow cell. Add a small % of organic solvents (e.g. acetonitrile or methanol ~5%).

Use of Solvents

Observe the following recommendations on the use of solvents.

- Brown glass ware can avoid growth of algae.
- Avoid the use of the following steel-corrosive solvents:

  Solutions of alkali halides and their respective acids (for example, lithium iodide, potassium chloride, and so on),

  High concentrations of inorganic acids like sulfuric acid and nitric acid, especially at higher temperatures (if your chromatography method allows, replace by phosphoric acid or phosphate buffer which are less corrosive against stainless steel),

  Halogenated solvents or mixtures which form radicals and/or acids, for example:

  $2CHCl_3 + O_2 \rightarrow 2COCl_2 + 2HCl$

  This reaction, in which stainless steel probably acts as a catalyst, occurs quickly with dried chloroform if the drying process removes the stabilizing alcohol,

  Chromatographic grade ethers, which can contain peroxides (for example, THF, dioxane, di-isopropylether) such ethers should be filtered through dry aluminium oxide which adsorbs the peroxides,

  Solvents containing strong complexing agents (e.g. EDTA),

Mixtures of carbon tetrachloride with 2-propanol or THF.

Agilent Technologies on the Internet

For the latest information on products and services visit our worldwide web site on the Internet at:

http://www.agilent.com

Select “**Products**” - “**Chemical Analysis**”

It will also provide the latest firmware of the Agilent 1200 series modules for download.

Index

A

accessory kit
micro well plate sampler 260
accessory kit
high perf. autosampler 259
advanced operating modes 20
Agilent Lab Monitor & Diagnostic Software 110
Agilent on internet 311, 311
air circulation 28
algae 309, 309
analog cable 282, 284
analog
signal output 74
APG remote connector 75
ASIC 58
autosampler accessory kit contents 35, 259, 260
autosampler accessory kit 35
autosampler control 56
autosampler microtiter plate board 58
auxiliary cable 282, 296

B

battery 59
safety information 305
BCD board 66
BCD cable 294
BCD/LAN board 66
BCD
cable 282
bench space 28
bench space 28
board
HP JetDirect card 69
boards
interface board (BCD/LAN) 66
LAN card 69
bypass 12

C

cable
analog 282, 284
auxiliary 282, 296
BCD 282, 294
CAN 297
connecting modules 39
external contacts 283, 298
GPIB 283
remote 282, 287
CAN cable 297
CAN
interface 73
capillaries 49
changing
serial number and type 235, 235
ChemStation
changing serial number and type 236
choice of vials and caps 104
cleaning 170
common electronics 58
compensation sensor open 123
compensation sensor short 124
condensation 28, 28
configuration switch
default settings 77
description and factory setting 77
Control Module
changing serial number and type 238

D

damaged packaging 34
delivery checklist 34, 34
draw speed 104, 104
DRAW 104

E

eject speed 104, 104
EJECT 104
electronics
ASIC 58
battery 59
fan drive 59
MTP board 58
sample transport control 59
sampling unit control 60
sensors 57
EMF counters 173
setting 174
using 174
environment 26, 28, 28
error messages 111, 115
error messages
arm movement 129
compensation sensor open 123
compensation sensor short 124
fan failed 125
front door error 127
initialization failed 136
invalid vial position 139
leak senso open 121
leak sensor short 122

leak 120
metering home failed 137
missing vial 135
motor temperature 138
needle lock failed 132
needle to needle seat position 133
peristaltic pump error 140
shut-down 117
synchronization lost 118
timeout 116
valve to bypass failed 130
valve to mainpass failed 131
vessel error 141
vessel stuck to needle 142
ESD (electrostatic discharge) strap 169
external contact cable 283, 298

F

factory settings 77
failure 111
fan failed 125
firmware
description 63
main system 63
resident system 63
update tool 64
updates 63
flow connections 49
flow cell 309
solvent information 309
Forced Cold Start
settings 80
fuses
BCD board 66

G

G1373A 262
GPIB cable 283
GPIB
default addresses 78
interface 73

H

hall sensor 57
HP JetDirect card 69

I

illumination assembly 206
information
on lithium batteries 305
injection valve 16
injection volume precision 104
injection volumes less than 2 µl 104
injection sequence 12
injection valve 8, 15
injection volume 104
injection volumes 104
installing the autosampler
flow connections 49
interface cables 42
power cable 42
safety 42
sample trays 84
installing the sample tray 51
installing the thermostatted autosampler
interface cables 45
power cable 45
preparation 46
safety 42, 45
installing the thermostatted autosampler
tray cover and front cover 53
Instant Pilot
changing serial number and type 237
instrument status indicator 113
interface board (BCD/LAN) 66
interface
Agilent 1200 Series 71
analog signal output 74
CAN 73
GPIB 73
remote 75
RS-232C 73
interfaces
special 76
internet 311, 311
introduction to the autosampler 8
IR sensor 57

L

LAN cables 300
LAN
communication interface board 69
interface board 66
leak sensor open 121
leak sensor short 122
leak 120
LMD software
changing serial number and type 235
low volume injections 104

M

main board 58
mainpass 12
maintenance functions 111, 143
maintenance procedures 175
maintenance functions 172
step commands 145
maintenance procedures 22
metering device 104
metering device 15
metering seal 269
microswitches 57
missing parts 34
MTP board 58
multi-draw option 8

N

needle flush station 17
needle lock 17
needle drive 15
needle/sample transport assembly 18
numbering of vials 84

O

operating modes 20
optimizing performance
automated needle wash 104
delay volume 104
delay-volume adjustment 104
early maintenance 104
inject-valve seal 104
low-volume capillary kit 104

P

park transport assembly 53
parts and materials
cover parts 275, 275
foam parts 276
leak system parts 279
power and status light pipes 278
sheet metal kit 274
vial trays and tray base 257
parts and materials
accessory kit SL 259
accessory kit 261
analytical-head assembly 269
autosampler sampling unit assembly 267
injection valve assembly 272
injection-valve assembly 272
maintenance kit 261
multi-draw kit 261, 261
sampling unit assembly 266
thermostat 262
transport assembly 254
parts and meterials
accessory kit micro well plate 260
parts identification
cables - LAN cables 300
Peek seal 106
performance specifications 30
physical specifications
autosampler 29
power cords 27, 27
power supply indicator 113
Power Consideration 26
power requirements 26

R

radio interference 307
recovering
changing serial number and type 239
reflection sensor 57
remote cable 282, 287
remote
interface 75
repair procedures 171
repairs
exchanging internal parts 199
exhaust fan 229
fan 227
injection-valve assembly 219
leak sensor 249
main board (MTP) 232
main cover 202
maintenance procedures 175
metering plunger 188
metering seal 188
metering-drive motor and belt 222
MTP board 232
needle assembly 176
needle-drive motor and belt 225
power supply 246
rotor seal 187
sampling unit 211
SLS board 243
SUD board 240
top cover and foam 204
transport assembly 208
using the ESD strap 169
rotor seal 272
rotor seal 106, 272
RS-232C
cable kit to PC 299
interface 73
settings 78

S

safety information
on lithium batteries 305
saftey class I 302
sample trays 84
numbering of vial positions 85
sampling sequence 11
sampling unit 15
seals 106
metering seal 269
rotor seal 272
rotor seal 272
seat capillary 107
sensors 57
serial number/type
using ChemStation 236
using Control Mmodule 238
using Instant Pilot 237
using LMD software 235
serial number
changing 235, 235
shipping containers 34
shipping 53
shut-down 117
site requirements 26
solvent information 309

solvents 309
sound emission 308
special
  interfaces 76
specifications 29, 30
stack configuration
  rear view 39
  rear view 41
  thermostatted autosampler 41
stator 16
status indicator 111
status indicators 113
Stay-Resident
  settings 80
step functions 112
step commands 145
storage 28
switch
  configuration settings 77
sychronization lost 118

T

Tefzel seal 106
temperature sensor 120
temperature 28, 30
thermostat 264
theta-axis 18
timeout 116
transport assembly 18
transport mechanism 8
transport 53
transporting the autosampler 53
tray combinations 85
trays 84
type
  changing 235, 235

U

unpacking the autosampler 34

V

valve capillaries 49
Vespel seal 106
vial contents temperature 30
vial numbering 84
vial tray 53
vial racks 8
vials 8
viscous samples 104, 104

W

weight 28

X

X-axis 18

Z

Z-axis 18

www.agilent.com

In This Book

This manual contains service information about the Agilent 1200 Series High Performance Autosamplers & Micro Well Plate Autosampler. The manual describes the following:

- introduction to the sampler,
- site requirements and specifications,
- installing, configuring and using the autosampler
- optimizing performance,
- troubleshooting and diagnostics,
- maintenance and repair,
- parts and materials,
- information on cables,
- safety and legal information.

© Agilent Technologies 2006, 2008

Printed in Germany
05/08

G1367-90110
G1367-90110

G1367-90110

Agilent Technologies